

Reassembling Hydrosocial Metabolic Relations:
A Political Ecology of Water Struggles in Chile

by

Robinson Torres Salinas

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Graduate Supervisory Committee:

Bob Bolin, Chair
David Manuel-Navarrete
Kelli Larson

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ABSTRACT

This research investigates the dialectical relationships between water and social power. I analyze how the coupled processes of development, water privatization, and climate change have been shaping water struggles in Chile. I focus on how these hydro-struggles are reconfiguring everyday practices of water management at the community scale and the ways in which these dynamics may contribute to more democratic and sustainable modes of water governance at both regional and national scales. Using a historical-geographical and multi-sited ethnographical lens, I investigate how different geographical projects (forestry, irrigated agriculture, and hydropower) were deployed in the Biobio and Santiago regions of Chile during the last 200 hundred years. I analyze how since the 1970s, these hydro-modernization projects have been gradually privatized, which in turn has led to environmental degradation and water dispossession affecting peasants and other rural populations. I frame these transformations using the political-ecological notion of hydrosocial assemblages produced by the different stages of the hydro-modernity—Liberal, Keynesian, Socialist, Neoliberal. I detail how these stages have repeatedly reshaped Chilean hydrosocial processes. I unpack the stages through the analysis of forestry, irrigation and hydropower developments in the central and southern regions of Chile, emphasizing how they have produced both uneven socio-spatial development and growing hydrosocial metabolic rifts, particularly during neoliberal hydro-modernity (1981-2015). Hydrosocial metabolic rifts occur when people have been separated or dispossessed from direct access and control of their traditional water resources. I conclude by arguing that there is a need to overcome the current unsustainable market-led approach to water governance. I propose the notion of a

'commons hydro-modernity', which is based on growing environmental and water social movements that are promoting a socio-spatial project to reassemble Chilean hydrosocial metabolic relations in a more democratic and sustainable way.

DEDICATION

To my mother Soledad Salinas Gonzalez, a warrior who passed away on July of 2014.

In the hardest times of our lives, when we did not have money even to eat, you taught me to never give up. You also taught me that the only way to overcome our material poverty was by to studying. Only material poverty, because your soul and spirit were always full of richness. As you can see, I took seriously your advice, and I wish you were here to taste this victory with me, because a great part of this PhD is yours. But I know that in some way you are celebrating with me. Thank you mom, you and daddy made me the person who I am today, and for that reason I dedicate this PhD to you. The next generations will know every detail about your example of struggle. Love you forever!

Hasta la victoria, siempre (Ernesto “Che” Guevara)

Marichiweuw (We will win a hundred times) (Mapuche)

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CHAPTER 1

REASSEMBLING HYDROSOCIAL METABOLIC RELATIONS: A POLITICAL ECOLOGY OF WATER STRUGGLES IN CHILE

1. Introduction

The purpose of this doctoral dissertation is to fill a gap in knowledge of the political ecology of water struggles in Chile. It is increasingly recognized at global and regional scales that water is an emergent source of social conflict, especially in developing countries like Chile. The conflicts over water are closely related to global processes such as development, water privatization and climate change. In this context, my research develops a political ecological approach to study the socio-natural relationships between water and social power in Chile. My objectives are to analyze 1) how the coupled processes of development, water privatization and climate change are shaping water struggles in Chile, 2) how these water struggles are impacting the everyday practices of water management at the local scale and 3) how the dynamics of water struggles are contributing to more democratic modes of water governance.

The significance of this investigation is in its contribution to critical social sciences of the environment, political ecologies of water in developing countries, and historical-geographical, multi-sited ethnographies of water. I seek to explore how water struggles can contribute to more egalitarian and democratic forms of water governance. In addition, in the course of this investigation I used ethnographic and archival methods suitable for capturing historical-geographical trends in water management during Chile's process of capitalist modernization. As this methodological approach has been neglected

in the water literature, my research will provide new insights into the relationship between water and social power in a multi-sited, comparative framework, analyzing the contentious dynamics within and between different socioeconomic sectors that use intensively water, such as forestry, hydropower, and irrigation.

The broader impact of my research will be to produce and disseminate new knowledge regarding emerging water struggles in the context of increasing institutional concerns about how extractive activities, neoliberal policies over water resources and climate change have induced water shortages. In Chile, these concerns are currently being transformed by new government policies and water reforms (Delegacion Presidencial para los Recursos Hidricos, 2015; Bauer, 2015). Research results will inform these concerns using nuanced knowledge about how emerging water social movements are creating an alternative project to the neoliberal governance of water that currently exists in Chile.

In this introductory chapter, first I present my research problem and research questions (section 2). Second, I situate the research problem in depth through an introduction to the processes of water privatization and production of water subjects and water struggles in Chile (section 3). Third, I describe my research methods, which include the description of research sites, the presentation of both data collection and data analysis techniques, and the general description of the ethnographic process that I undertook during my 2014 fieldwork in Chile (section 4). Finally, I close this introductory chapter by providing an overview of the dissertation's chapters (section 5).

2. Research Questions

This doctoral dissertation investigates the dialectic relationships between water and social power (Swyngedouw, 2004, 2009, 2015). Using a historical-geographical and ethnographical lens, I investigate how during the 19th and 20th centuries different geographical and interrelated water projects (irrigated agriculture, forestry, and hydropower) were deployed in the Biobio and Santiago regions of Chile. I analyze on how since the 1970s, these water and modernization projects were gradually privatized. This includes the processes of land dispossession and water privatization associated with counter-agrarian reform, which coupled with climate change has been producing new water subjects and increasing water struggles in the Biobio and Santiago regions of Chile. In doing so, I examine the problem of how these struggles are reconfiguring water management in both the everyday life practices of local water subjects, and the regional and national scales of water governance. My goal is to investigate in what ways these water struggles are contributing to democratizing the water governance at different geographical scales, from the local to regional and national scales. In analyzing these processes, I address the following research questions:

- a) How are the processes of development, water privatization, and climatic change shaping water struggles in the study areas?
- b) How are the dynamics of water struggles transforming the everyday life practices of water management?
- c) Are everyday local scale water struggles contributing to more democratic modes of water governance at regional and national scales?

3. Situating the research problem: Development, water privatization, and water struggles in Chile

Development and Water Privatization

Over the last 200 years, Chile's water management system has undergone several regime changes, broadly shifting from a private to state-owned system, and then to a privatized again. In terms of recent history, this transition has taken place during the great transformation from a democratic social system to a neoliberal one. Specifically this refers to the processes of agrarian reform undertaken by the governments of Eduardo Frei Montalva (1964-1970) and Salvador Allende (1970-1973), which was followed by the neoliberal globalization implemented by the Pinochet dictatorship (1973-1990), and was subsequently managed by democratic governments (from 1990 onwards).

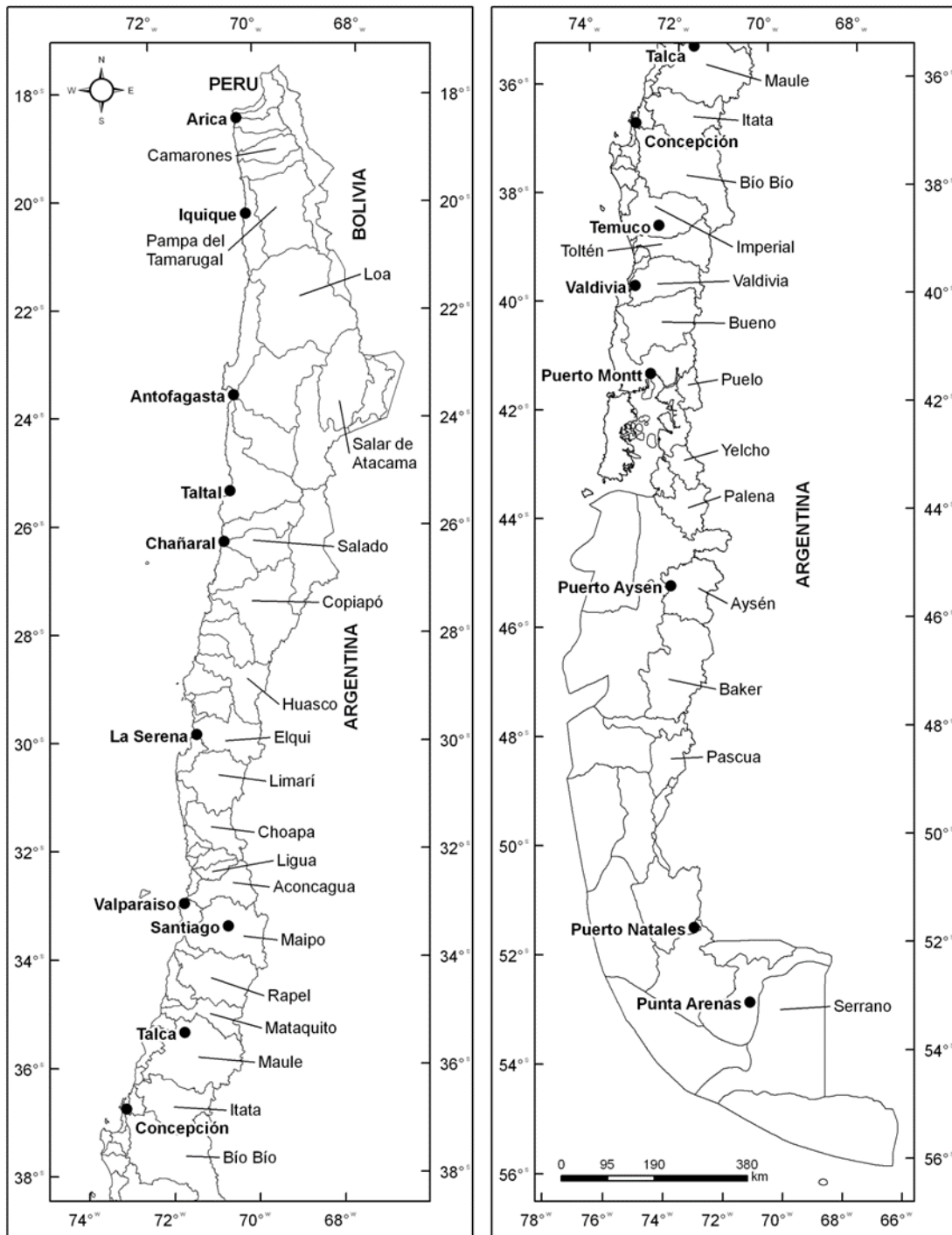
During this period (1964-2015), Chile has experienced different and opposite development initiatives, from democratic initiatives (both reformist and socialist) up to military dictatorship initiatives, and subsequent authoritarian and democratic neoliberal ones (Moulian, 1983, 1997; Fazio, 1997; Klein, 2007; Atria et al, 2013). Water management was subsumed into each one of these political projects. During the period of agrarian reform (1964-1973), water was nationalized as an integral element in the initiative to redistribute land to peasants and poor rural populations (Bauer, 1997; Bellisario, 2006). During the Pinochet dictatorship, water was (re) privatized through a new Water Code enacted in 1981. Land was also privatized through processes of counter-agrarian reform (Bellisario, 2007a, 2007b; Bengoa, 1983, 2013; Klubock, 2014: 239-267). The consequences of the neoliberalization of water have been the creation of new

rules of governance and the transfer of the ownership of water rights from the state to the private sector. These consequences, in turn, have produced a substantial reconfiguration of social power relationships in the arena of water resources management in Chile (Budds, 2009; Bauer, 2015). This is so because during this neoliberal turn (1973 onwards), global and local corporations have been appropriating—often at very low prices and even for free—environmental commons such as land and water, creating new forms of commoditization of nature and the dispossession of public goods. These practices were implemented by Pinochet and his free market’s advisers known as “the Chicago Boys” (Valdez, 1995; Klein, 2007), and continued during the neoliberal democracy that arose after Pinochet left office in 1990. To do this, the National Constitution of 1925 was done away with and a new one—a non-democratic one—was ratified in 1980 (Salazar, 2009, 2011). The latter laid the foundation for the 1981 Water Code. In effect, article 19 (number 24) of the 1980 Constitution states that water is private property, and protects its owners from eventual expropriation (Bauer, 2004; 35-36; Mundaca, 2014: 24; Orrego, 2014: 65). Since then, Chilean water has been subsumed under the logic of capital in its neoliberal conception, which has created an unprecedented water market.

One of the main consequences of the Chilean water market model has been the accumulation of water rights by large corporations which are dedicated to extractive activities and which intensively use (and contaminate) both surface and ground water. In this research, I analyze in detail three of these extractive development strategies: forestry (chapter 3), irrigation (chapters 4 and 5), and hydropower development (chapter 6). My

sites are the Biobio and Santiago regions, specifically the Itata and Maipo river basins, respectively (Figure 1.1)

Figure 1.1: Geographical location of the main urban centers and river basins in Chile



Source: Center for Environmental Sciences EULA-Chile, adapted from DGA (1986: 32)

Prior to the enactment of the 1981 Water Code, Chilean water was governed by the 1951 Water Code. The 1951 Water Code, which was modified in 1967—the latter modification due to agrarian reform—framed land and water as a unit. That unity of land and water was ruptured by the 1981 Water Code, in which water was alienated from land for (market) governance purposes. The key legal element to understand in the Chilean water market model is the categorization of water rights. In the 1951 Water Code, these were defined as “a real right of public domain embodied over water and that consists in the use, enjoyment and disposition of them”. That is, water rights “are to be used, enjoyed and disposed without this representing a transfer of ownership of the water” (Donoso, 2004: 26), which is to say, from the state to the private sector. Such conditions remained when the Chilean Keynesian state took the lead in the governance of natural commons (e.g. lands and forests; see Klubock, 2014), and private initiatives were subordinate to the public domain in regards to water resources. During this period, the private sector was able to use water, but they could not attach property rights to it. What changed between 1967 and the 1981 Water Code, was the nature of ownership over water, based on “use rights” (“derechos de aprovechamiento”) which was altered during the shift from a state to a market-based system. In other words, the 1981 Water Code “established the rules for the reallocation of water among various uses, which should be realized through the market, abandoning the [state] centralized systems” (Peña, 2004: 17).

There are several main characteristics of the new privatized status of Chilean water. Legally and ideologically water is separate from land (which previously was combined during agrarian reform). Water is a public good, but paradoxically now can be privatized. Lastly, water rights are allocated at no cost from the state to private players

through the National Water Directorate (DGA). Furthermore, once these rights have been allocated, they are granted in perpetuity and can be commercialized by private owners. In this way, water became a commodity and the conditions for the birth of water markets, in which water proprietors can sell the water rights, were created. The most critical point is that water rights have been granted in perpetuity, and this has resulted in the accumulation of water rights by large corporations, mainly in the extractive activities such as mining, forestry, and hydropower sectors (Budds, 2009; Larraín, 2012; Romero et al, 2012; Bauer, 2013). In addition, the 1981 Water Code's nature is problematic because it was enacted under the Pinochet dictatorship; therefore, there are deep legitimating problems regarding its ability to contribute to democratic forms of water governance. While it was reformed in 2005, it did not change the status of water as commodity with rights granted in perpetuity (Bauer, 2013, 2015; Mundaca, 2014: 23).

The outcome of the privatization of Chile's water has been the production of a new socio-ecological configuration, which combines social inequality in the allocation of water rights with the increasing environmental degradation of aquifers, wetlands and rivers by large-extractive activities (Larraín, 2012; Romero et al, 2012). This has occurred because of increasing water demands due to forestry, hydropower, agribusiness, and mining developments, as well as reduced supplies due to climate change (Bauer, 2004, 2013; Budds, 2009, 2013; Larraín, 2012; Romero et al, 2012).

Water movements and water struggles

In response to this new neoliberal hydrosocial configuration (Swyngedouw, 2009), new water social movements have emerged locally throughout the country to

defend their rights to water and natural resources. Since at least 2005, these local water movements are at the forefront of the growing social conflicts over water in Chile (Bauer, 2015). Geographically, they are distributed from the arid north to the wetter south. These conflicts over water pit large corporations in key extractive economic sectors—such as mining, forestry, and hydropower—against peasants, small farmers, indigenous people, entrepreneurs in the tourist industry, activists, students, and other non-governmental organizations (Budds, 2009; Larraín & Poo, 2010; Larraín & Schaeffer, 2010; Larraín, 2012; Romero et al, 2012).

My research problem is situated in this new historical-geographical configuration, in which new subjectivities are increasingly contesting the neoliberal model of water governance in Chile. I investigate how the coupled processes of commodification of water under the contexts of intense extractive economic activities and climatic changes have created the conditions for the emergence of new water movements in two regions of Chile (Biobio and Santiago). These local water movements are contesting these extractive activities because, among other reasons, they are producing water scarcity and environmental degradation. To the extent that this occurs nationwide in different regions and locales, these water movements are articulating their struggles with water struggles elsewhere.

The emerging social movement is composed of individuals, groups, and organizations distributed in Chile from Arica to Patagonia (Larrain & Poo, 2010). After almost a decade of articulation and networking, this Chilean water movement has led three national water protests (2013, 2014, and 2015) and at the moments that I write these

lines (March 31 of 2016) they are preparing the fourth. The first was in April of 2013, when different local movements marched from both the north and south of the country, to finally assemble and protest collectively in downtown Santiago, demanding the de-privatization of water and a new water policy for the country. For many participants, this mobilization meant a long walk from the north and south of the country. They finally met in Santiago, where they formed the first national scale social mobilization for water in Chile (Mundaca, 2014). In April of 2014, these same organizations repeated the experience and deployed the second national march for the defense and recovery of water, also gathering in downtown Santiago. The third nationwide water protest was launched in April 2015 in the city of Valparaiso, located in the central coastal area of Chile, and the fourth in Temuco city in the Araucania region.

These four consecutive national water protests are symptomatic of a growing water social movement, which is closely linked to the general social protests that have occurred in Chile since 2011. These anti-neoliberal movements have been led by the student movement that emerged strongly in 2006 but finally exploded in the political arena in 2011 (Rojas, 2012; Stromquist et al, 2013). This nationwide social movement has as its goal the elimination of the profit and market model in the education system, proposing that education (at all levels, from elementary to university) must be free for all because is a social right, not a commodity. During the Presidential campaign of 2013, Michele Bachelet picked up the student movement demands, promising free education if she were elected. In December 2013, she was finally elected with 64% of the vote in the second round, which clearly expressed the support and legitimacy of the student's demands for Chilean society. Bachelet took the office in March 2014. Since then there

has been a national process of discussion—in the parliament, political circles, the student movement and Chilean society in general— debating how to implement this free education system. Indeed, all these processes and outcomes can be interpreted as a partial triumph of the student social movement. I say ‘partial’ because it is still being debated and no final decisions have been made yet, but the promise is that free education will be implemented before Bachelet leaves office in 2018. Nonetheless, these anti-neoliberal movements led by Chilean students are very significant for this research because they demonstrate that social mobilization is the key to producing radical social changes. During her campaign in 2013, Bachelet also was supported by different environmentalists and other eco-political groups, who demanded a new water policy to better deal with the negative socio-ecological outcomes of water markets and the drought. Bachelet also considered this demand in her program, promising to reframe the current water policy, in particular, promising deep reforms to the 1981 Water Code. As I will demonstrate in this dissertation (chapters 5 and 6), however, these reforms were largely inspired by what Karen Bakker calls “market environmentalism”, which proposes the “the privatization of resources, the commercialization of environmental management, and the liberalization of governance” (Bakker, 2010: 38). This is so because the water reforms initiated by the government of Bachelet in 2014, which I witnessed during my ethnographic fieldwork in Chile between August and December 2014, were in part framed under the suggestions of two World Bank reports (Banco Mundial, 2011, 2013). Succinctly, these reports assesses the current failures in the Chilean water market model and the water state institutions. It identifies its different pitfalls, but the reports only suggests reforms within the current

neoliberal model of water governance, while avoiding a critique of the privatization and hoarding of water rights.

In chapters 5 and 6, I will analyze these market oriented water reforms undertaken by the government of Bachelet in more detail. Here, I only want to emphasize that these water reforms are also, in part, an outcome of the pressures put on the Chilean government by the emerging water movement. The new water subjects' demands are similar to the students' demands: They seek to eliminate (or at least put clear limits on) water markets, particularly because they disagree with the monopoly power over water rights by privileged economic groups (local and global), and dislike the ecological effects on water bodies (contamination, depletion, and overexploitation, among others), which in turn have been producing water scarcity and dispossessing water from local populations. Throughout this dissertation, I will demonstrate how these processes have occurred in the Biobio and Santiago regions.

I contend that this developing water social movement is still in formation, emerging locally but spreading regionally and nationally in various regions and towns of Chile. This water movement represents a social response to the processes of water dispossession caused by large developer's geographical projects (Harvey, 1996; Bakker, 2010; Swyngedouw, 2015). The production of subjectivities and identities, and the processes of socio-ecological transformation being mobilized by these water movements is a central issue in this dissertation. Throughout the country, different development megaprojects, including forestry plantations and related industries, as well as dam projects are dispossessing rural communities of their water (Larrain & Poo, 2010; Mundaca, 2014; Bauer, 2015). In turn, these communities of peasants and small farmers,

in the light of the pollution and depletion of rivers and aquifers on which they depend, have begun to organize against these growing environmental injustices (Romero et al, 2012; Larrain & Poo, 2010; Larrain, 2012; Mundaca, 2014; Torres et al, 2015). The social nature of water is being mobilized by water subjects, who are demanding that water be de-privatized, who are claiming water as a public good, and who are proposing to create new and more democratic water policies. All of this implies that there is a growing mass of demands for a new Constitution, a new Water Code, and a new national regime of water governance (Salazar, 2009; Larraín, 2012; Mundaca, 2014; Bauer, 2015). How can we understand the emergence of this water social movement in Chile? How are these water struggles internally related to the processes of water privatization, counter-agrarian reform, and the general processes of the neoliberalization of natural commons, all of which were initiated under Pinochet but became further entrenched under the democracy that followed? How are water subjects contesting the hegemonic water market model in the nation and opening new emancipatory possibilities for more democratic modes of water governance? In chapter 2 I present my theoretical framework, by which I intend to construct a political-ecological approach to understand and explain these transformative processes related to water politics in Chile. Before turning to that, in the next section I describe my research methods.

4. Research methods: Multi-sited ethnographies of water struggles in Chile

Introduction to the research sites

In Biobio, water problems are partially associated with the forestry developments located throughout the region, but mainly concentrated in the dry lands of the coastal cordillera and pre-Andes cordillera, as well as a dam-reservoir project (Punilla) which is located upstream of the Ñuble river in the Andes cordillera. In Santiago, water struggles are also associated with a hydroelectric project (Alto Maipo) that is located upstream of the Maipo river in the Andes cordillera.

In addition, the Biobio and Santiago regions have an intense irrigated agriculture industry in the central valley in common, in which there are complex systems of canal irrigation and artisanal water systems. These rural water networks were created and have historically been managed by traditional landowners, and since the agrarian reform (1964-1973), also by water communities of peasants and small-farmers, through water user organizations. Although these organizations can be traced to the colonial era of the Spanish empire (Bengoa, 1988; Sociedad del Canal del Maipo, 1997), today they are an excellent example of the institutionalized relationship between water and economic power, particularly since the introduction of the 1981 Water Code. That is because the relative power of each organization is equivalent to the quantity of water rights they own, which are expressed in “water shares” (liters per second). These organizations have an annual meeting in which decisions regarding infrastructure and water works expenditures for the next irrigation season are made. The decision-making power of an organization is directly proportional to the quantity of its water shares. The organizations (and

individuals) holding more water shares are commonly associated with medium to large scale agribusiness interests that hold key decision-making positions. Conversely, the organizations with fewer water shares are commonly associated with marginalized peasants and small-farmers. Several water struggles in Biobio and Santiago are closely associated with the underlying power structure and disputes over property rights of water, wherein more water rights are correlated with more economic power. In turn, this means more decision-making power within the water user organizations (particularly at its higher level in the Junta de Vigilancia), among other things, because water shares have money value in the water market.

These systems of collective management of water for irrigation also are being affected by climatic change and lack of sufficient water during the irrigation season. In this respect, agricultural activities in the Biobio and Santiago regions are being strongly affected by a trend toward increased aridity and long-term drought (Meza et al, 2012; Torres et al, 2015). This situation is decreasing the quantity of water available to each canal and water organization during the irrigation season, leaving crops exposed to water shortages. This situation produces intra-canal water conflicts between irrigators through “water thefts” due to scarcity. Water thefts happen when an irrigator opens the gate of his canal outside of permitted times. Irrigators have strict daily and weekly schedules to irrigate their crops, but during the irrigation season, they frequently do not respect these schedules.

To reduce increasing vulnerabilities to water shortages, avoid water thefts, and increase the irrigated surface in the central valley, a reservoir project has been initiated in the Biobio region to provide water security during the irrigation season. This reservoir,

which is called “Punilla”, is promoted by the Chilean state (Ministry of Public Works, MOP), but it will be built and managed by private corporations, and it will have a double function. It will produce electricity throughout the year and supply water for the critical days of the irrigation season. The latter has received strong support by the farmers, but they do not completely agree with the year-long production of electricity due its effect on water quantity during the time it is most needed. In addition, the reservoir also has received fierce opposition from local people who are directly affected by its construction, as well as activist and other environmental groups, because the dam construction would flood around 1,700 hectares of native forest and biodiversity upstream in the Andes and displace local inhabitants.

In Santiago, Alto Maipo is a hydroelectric project announced in 2007. Since then, this ecological project has also generated fierce opposition and a growing water movement against it. Proposed by an alliance between the transnational AES Gener (60%, USA) and the national Antofagasta Minerals (40%, Chile/Luksic group), this hydropower project is different from Punilla. Unlike Punilla, Alto Maipo is not a dam but a run-of-river hydropower project oriented to produce power to supply the Central Interconnected System (SIC), but it also is intended to power mining projects in northern Chile. Punilla is oriented towards producing hydroelectricity to supply the SIC too, but in theory it is mainly oriented to accumulating water to irrigate agriculture in the central valley.

However, Punilla and Alto Maipo projects are seen not only by activists, but also by a significant portion of Chilean society, as large hydroelectric projects representing elite interests that will damage the rivers and environment, will create serious risks for

the water supply, and will help consolidate the neoliberal water model in which water is transformed into capital, uniquely benefitting national and transnational economic groups. This is particularly relevant in the case of the Alto Maipo project, which intends to use Andes mountain water in Cajon del Maipo, an area in which also hosts the “Embalse El Yeso” (El Yeso reservoir), the main source of drinking water to Santiago city, the Chilean capital of more than seven million inhabitants (INE, 2014: 102).

In this respect, each of these hydroelectric projects in Biobio and Santiago has produced its own oppositional water movement: “Ñuble without Dams” and “No Alto Maipo”, respectively. These new water subjects have participated actively in the water protests of 2013, 2014, and 2015. Indeed, the rejection of HidroAysén project in Patagonia by the Bachelet government in June 2014 (see Appendix) is giving hope to activists against Punilla and Alto Maipo, radicalizing their strategies against these projects. In short, although I am not going to focus on the rejected HidroAysén project, my previous research experience in Patagonia will serve as a background to understanding the anti-dam activism against the Punilla and Alto Maipo projects in broader terms (Chapter 4).

In sum, the hydrosocial configurations of the Biobio and Santiago regions share similarities and differences that will be analyzed in this research. Both research sites highlight how new geometries of water governance and social power are triggering conflicts between peasants, small-farmers, and activists on the one hand with large geographical projects and the state, on the other.

Research design

The process of primary data collection

I began my multi-sited ethnography (Marcus, 1995) in the Biobio region (July-mid-October 2014) and I then continued in Santiago (mid-October-December 2014). A total of 59 ethnographic interviews (and other digital recordings) were conducted in 17 communes of the Biobio region (Table 1.1), while 62 ethnographic interviews (and other digital recordings) were conducted in 20 communes of the Santiago region (Table 1.2). Table 1.3 summarizes the 121 interviews and other recordings that total 129.3 hours of digital recording in both regions, according to the type of water subject/stakeholder. I have classified water subjects and/or stakeholders in five general categories. First, “peasants and farmers” includes subsistence farmers, small farmers, but also medium to large farmers, some of whom hold head positions in water user organizations. Second, “public officials” includes interviewees to individuals working in central (national), regional, and local (municipal or commune) governments.

Table 1.1: Number of ethnographic interviews/records, according to water subject/stakeholder and communes in the Biobio region

Communes	Peasants and farmers	Public officials	Activists/ Protests records	Scholars	Water meetings records	Other
Chillán	2	4			2	
Cobquecura	3	2				2
Threhuaco	2	1			1	
Coelemu	1	1				
Portezuelo	1	1				
Quirihue	2	1				
Ránquil	2	3				
San Carlos	5					
San Fabian	1		2			
San Nicolás	1	1				
Ninhue	1	1				
Quillón	1					
San Ignacio	1					
El Carmen		1				
Pinto	3					1
San Pedro			1			
Concepción		3		3	2	
Total	26	19	3	3	5	3

Source: author's fieldwork

Third, the “activists” category includes interviews to anti-dam water subjects, and digital recordings of different public speeches deployed in two water protests against the Alto Maipo hydroelectric project. One was staged in San José de Maipo (October 24, 2014) and the other one in Santiago Centro (December 13, 2014). I attended these two water protests, recording visual and other important data, but also I made important contacts with lead activists that I subsequently interviewed. Fourth, “scholars” includes water and other environmental specialists from University of Concepción (Biobio), University of Chile and the CENDA research center (Santiago), who also contributed with important information about the regional scenarios of water conflicts in

both regions. Lastly, a brief explanation of what I mean by “water meetings” . At the beginning of my fieldwork in Biobio (August 2014), I re-activated my personal and professional networks with different academic, governmental and non-governmental institutions from Biobio. This served as a first step to identifying the main water subjects and stakeholders to be interviewed. Some of them invited me to participate in some meetings in which they discussed water problems in the regions. These then are the “water meetings”.

The first water meeting was with the research team of the CRHIAM project (see Appendix), and it took place in the Center for Environmental Sciences EULA-Chile in the University of Concepción. In this situation, I was invited to present my doctoral research project, but during the meeting the different researchers also discussed specific water problems and conflicts affecting the region and country, particularly the Punilla project and the water reforms of Bachelet’s government. I held additional meetings with the CRHIAM twice during August and September 2014, but without recording them.

Table 1.2: Number of ethnographic interviews/records, according to water subject and communes in the Santiago region

Communes	Peasants and farmers	Public officials	Activists/ Protest records	Scholars	Water meetings records	Other
San José de Maipo	2	2	6			1
Pirque	1					
Buín	1					
San Bernardo		1				
Calera de Tango		2				
Padre Hurtado	1					1
Talagante	1	1				
Curacaví	3	1				
Isla de Maipo	3	1				
María Pinto	2			1		
Melipilla	2	1	1			
San Pedro	3	2	2			
Lampa	3					
Colina	3	1				
Til-Til						1
Estación Central		1				
La Florida			1			
Santiago Centro		4	1	2	1	
Santo Domingo		1				
Valparaíso				1		
Total	25	18	11	4	1	3

Source: author's fieldwork

Table 1.3: Number of ethnographic interviews/records, according to water subject/ stakeholder and regions

Region	Peasants and farmers	Public officials	Activists/ Protests records	Scholars	Water meetings records	Other	TOTAL
Biobío	26	19	3	3	5	3	59
Santiago	25	18	11	4	1	3	62
Total	51	37	14	7	6	6	121

Source: author's fieldwork

The second meeting in Biobío was an invitation extended by a sociologist and friend who leads a NGO that presented a “risk mapping” of the northern area of the Biobío region. This meeting was conducted by the government of the Nuble Province (Chillán city, August 2014), in which different public officials (regional and municipal), rural leaders and other stakeholders attended. Among the topics discussed during the

presentation were the consequences of the 2010 earthquake, forest fires, and other social and ecological consequences of forestry development.

Once this second water meeting was finished, the NGO's attendees invited me to participate in a third water meeting. This was conducted by the Regional Government of the Biobio Region, located in Concepcion city. There I joined public officials from different state agencies (Environment, Agriculture, Public Works, and Water National Directorate, among others). The meeting was called "Consejo del Agua del Biobio" (Biobio's Water Council). This meeting was important because after it concluded, I was able to understand the main water problems and conflicts in the region. In particular, I became aware of the regional relevance of people living without water in rural areas. The meeting was focused on discussing how to coordinate different regional and local governments to mobilize resources to finance water delivery trucks and other water works, such as new rural potable water systems (known as APR–*Agua Potable Rural*) to solve the increasing problem of peasants without water in the region. Until that moment, I was not fully aware in detail of these specific water problems in the region. In consequence, I incorporated them as an issue to take into account in my ethnographic interviews in the rural areas.

I attended the fourth water meeting in Biobio as a result of an invitation that I received from a public official in INDAP (Ministry of Agriculture). This was a campesinos assembly in Chillán city, joined by around 50 peasants from the Nuble Province in the Biobio region. All attending had direct experiences of being tortured during the Pinochet dictatorship. In the assembly they shared some memories but also they shared their current demands as peasants. I also had the chance to ask them

questions during the meeting so I collected information about their views on several water projects in the Nuble river basin, mainly forestry plantation/industries and hydro plants projects.

Finally, the fifth water meeting in Biobio was one associated with the contamination of the Itata river by a forestry industrial plant. I was invited to this meeting by a community member who leads the opposition to the Industrial Forestry Complex Nueva Aldea, a factory which has polluted the water from both Itata river and aquifers in this area. In turn, this has left peasants without water, and for that reason this was one of the meetings that was attended by authorities from municipalities and the regional government, the Forestry Corporation (Forestal Arauco), and communities of peasants. The goal was to negotiate compensatory policies to supply water through water trucks to these new populations of peasants without water (chapter 3).

Overall, these five water meetings in Biobio provided me important contacts to begin my ethnographic interviews with peasants and farmers in the countryside. Following the principles of snowball sampling, I conducted topical life story interviews (Atkinson, 1998; Denzin, 1989) focused on themes and variables of relevance to my research questions. The biographical method or life story interviews (Atkinson, 1998) were conducted with different classes of peasants and farmers, guided by the criteria of saturation. Thirty-five out of the 51 interviews conducted with peasants and farmers in Biobio and Santiago were developed using this method. The other 16 were semi-structured or informal interviews. Within the social sciences, the biographical method has been recognized as an important strategy in the study of socio-historical change (Plummer, 2001a; Miller, 2000: 22). However, until now it has not been applied to

ethnographically investigate how the historical-geographical processes of water privatization, climate change, and large extractive activities produce water dispossession that has been experienced by local people in their everyday lives. Nor has it been applied in the context of multi-scale studies linking different geographical scales (local, national, global) within which water struggles are occurring. For this reason, my objective was to reconstruct peasants and small-farmers' life stories with agrarian reform, water privatization, drought, and their experiences of water conflicts with large-extractives activities. The peasants' and small-farmers' life stories allowed me to identify some historical drivers, such as large extractive activities, that are creating increasing populations of peasants without water in both Santiago and Biobio regions.

One key condition to selecting these informants was that they were 50 years old or more, which was not difficult because the rural areas are commonly inhabited by old people. I interviewed poor peasants without water, and (richer) medium-large agribusiness farmers, some of whom hold director positions in Juntas de Vigilancia. These life stories and semi-structured interviews with peasants and the general category of farmers were complemented by semi-structured interviews conducted with scholars and activists struggling against the Punilla and Alto Maipo projects. These social groups, composed of peasants and farmers, scholars, and activists, represent the communities in this research.

The state is represented by different stakeholders from the central, regional, and local governments. I conducted a total 37 semi-structured "active interviews" (Holstein & Gubrium, 2002) with public officials from Biobio and Santiago. At the local government level, in the municipalities I mainly interviewed water truck managers and workers, and

professionals working in PRODESAL: Programa de Desarrollo Local (Local Development's Program). The latter is a joint program between the Ministry of Agriculture (INDAP) and the municipalities which supports the most vulnerable peasants and small farmers. The professionals working in PRODESAL know each commune and the areas mostly affected by water scarcity and water struggles very well. For this reason, I interviewed them whenever possible. Once the interview finished, I requested from them contact information for relevant peasants and farmers in each specific commune that I visited. This snow ball strategy worked very well, so that after some weeks, it was transformed into my main approach to each rural commune that I visited. I did the same with the municipal public officials in charge of the water trucks: after the interview, they provided me with information about the specific commune's sectors which contain the most affected *campesinos sin agua* (peasants without water). Then, I went to these specific places and I interviewed several *campesinos sin agua*.

At the regional and provincial level, in both the Biobio and Santiago regions, I interviewed public officials from the Ministry of Agriculture (INDAP, SAG, and CONAF), the Ministry of Public Works (MOP), and the National Water Directorate (DGA). Many of them, particularly those from INDAP, also provided me with valuable data about specific geographical areas, on communal and regional levels, and people affected by different water problems. Finally, I also interviewed two public officials holding the position of "presidential sub-delegate for water resources" in Biobio and Santiago. They were two professionals, one a political scientist, the other an engineer, who work under the direction of the Water Resources' Presidential Delegation (Ministry of the Interior) which is directly

designated by the central government as a first step in the context of the water reforms undertaken by Bachelet in May 2014 (chapter 5)

Data processing and discourse analysis

Once I finished the ethnographic fieldwork in December 2014, I returned to the USA and I began to organize the collected data. The first step was to begin the transcription of the interviews, which was done between March and September 2015. A total of 75 hours (out of 129.3) of digital recordings were transcribed. This work was financed from Chile, and carried out by undergraduate students from the Department of Sociology and Anthropology at the University of Concepcion. I personally supervised all the transcription processes. Once transcriptions were completed, I began analyzing my data, drawing on critical discourse analysis (Bernard & Ryan, 2010: 240). Critical discourse analysis is utilized to analyze the ethnographic data from my two sites. I aim to reconstruct the processes of hydrosocial changes in both sites, in part, through the peasants and small-farmer processes of subjectivation and narratives about their material experiences with water dispossession, degradation, and water struggles on all scales (see chapter 2).

Historical research and secondary data

This historical-geographical approach to water struggles, based on life stories and semi-structured interviews, was complemented by archival and historical research based on specific literatures and sources about selected topics. When I was collecting data in Chile, and once I began the transcriptions, I became aware of the need for this historical

research and other secondary sources to better illustrate my arguments. This historical research is based mainly in a critical literature review of specific references, both Chilean and foreign, related to the following themes:

- Development and the Chilean Keynesian state in the 20th century
- Forestry development
- Irrigation development, agrarian and counter-agrarian reform
- Hydroelectric and dams development
- Privatization and dispossession of public assets
- Historical development of social, environmental, and water movements in Chile

This historical research is complemented with other secondary sources. During the processes of ethnographic interviews and particularly with public officials and activists, I collected a large amount of archival and documentary data appropriate for this research project. Appropriate visual archives, statistics, and technical reports that help to answer my research questions were accessed. In addition, my personal contact with researchers working at the Center EULA-Chile and CRHIAM provided me with access to different thematic maps to illustrate specific geographical issues, for example research sites, forestry plantation coverage in Biobio, the location of hydro plants in Santiago and Biobio, etc. Finally, in the case of water conflicts related to the Punilla and Alto Maipo projects, and also to forestry development, information appearing in newspapers that report news about these projects and water struggles were reviewed.

5. Chapter overview

Chapter 2 presents the theoretical framework by which I analyze my data in chapters 3 to 6. I draw on arguments from the political ecology of water, emphasizing a dialectical and relational approach to water, and the different historical-geographical tendencies in development and water struggles, based mainly on state development, markets and privatization, and the role of communities in the scalar politics in water governance.

Chapter 3 analyzes how forestry development in the Biobio region emerged as a geographical project during the first decades of the 20th century, becoming increasingly a state-led project from the 1930s onward. Keynesian forestry development was particularly important during the period of agrarian reform and socialist hydro-modernity. However, public forestry assets have been gradually privatized since 1974. As a result of privatization today this forestry geographical project is dominated by private corporate power and is increasingly associated with water dispossession and hydrosocial metabolic rifts (the latter concepts defined in chapter 2).

Chapter 4 analyzes irrigation development, focusing on how the development of canal projects (particularly in Santiago) was closely associated with the growing social domination of large farmers over inquilinos and peones under the hacienda system. These processes were consolidated with the construction of the main irrigation canals in the central valleys of both Santiago and Biobio regions. These irrigators gradually organized themselves into water user organizations, which since the early 20th century have led agricultural development but also have experienced increasing conflicts with the state as a result of water expropriations to support urbanization. I emphasize the importance of

specific historical stages including the reformist and socialist periods of agrarian reform. It was in this latter period in which water was nationalized and irrigators had their water rights expropriated by the state once again. I finish this chapter with an historical and ethnographical analysis of both agrarian and counter-agrarian reforms as experienced by people who were affected by the process.

Chapter 5 continues the analysis of irrigation development in its neoliberal stage from the 1980s onward. I argue that although the 1980s was a high rainfall decade, it was also the decade in which water markets began. These markets have moved toward what I term the hydrosocial metabolic rifts of development (see chapter 2). As a result of water markets' role in the growing water crises, the state has begun to intervene to regulate the so-called free market. I analyze the 2014 Water Reform undertaken by the Bachelet government, which has presented serious challenges to privatized water rights which currently exist in Chile. I analyze how irrigators oppose these hydrosocial reforms and what the implications are for water governance.

Chapter 6 investigates hydropower development and its growing opposition led by environmental, anti-dam and water movements. Hydropower development was initially a liberal or private initiative (1897-1942), but analogous to forestry development, since 1943 it became more of a Keynesian geographical project. Then, during the ascendancy of neoliberalism in the 1980s and 1990s the hydropower sector was privatized. It was during these decades that environmental and anti-dam movements began to emerge in opposition to this sector. This new Chilean anti-dam activism illustrates the growing scalar politics against hydroelectric development, but also a gradual multi-scalar articulation of anti-dam activism with a broader water movement

that seeks to construct water as a commons in a new historical formation (see chapter 3). I also review the historical significance of different water subjects involved in Chilean processes of water governance, particularly corporations, the state, irrigators, water user organizations, indigenous people (Mapuche), and new environmental/water movements. I propose that a commons hydro-modernity offers new ways of conceptualizing hydro-governance across scales.

Chapter 7 I conclude by reviewing the main trends in the Chilean hydro-struggles, and the contributions that this research offers in the areas of the political ecology of socio-environmental projects, hydrosocial metabolic rifts, and the ongoing transformative processes that are shaping a new era of commons hydro-modernity. In doing so, I summarize how Chilean hydrosocial metabolic processes have been transformed during different hydro-modernization projects, and its significance for international debates on the possibilities for sustainable, democratic, and just modes of water governance.

CHAPTER 2

DEVELOPMENT, WATER PRIVATIZATION, AND SOCIAL TRANSFORMATION: ON HYDROSOCIAL ASSEMBLAGES, PROPERTY RELATIONS, AND THE POLITICS OF SCALE IN WATER GOVERNANCE.

“Uneven development is social inequality blazoned into the geographical landscape, and it is simultaneously the exploitation of that unevenness for certain socially determined ends”

Neil Smith, 2008, p. 206

Introduction

In this chapter, I present my theoretical framework wherein I seek to understand and explain the transformative socio-environmental processes related to water politics in Chile. I rely mainly (but not uniquely) on Marxist political ecology. By interrogating different processes and trajectories of uneven geographical development (Harvey, 1996; Smith, 2008; Swyngedouw, 2015), I discuss historical-geographical processes involved in the production of the Chilean waterscape (cf. Swyngedouw, 1999). First, I discuss the production of nature thesis as a relational ontology and epistemology in order to orient the political-ecological study of hydrosocial relations (Linton, 2010; Swyngedouw, 2015). Second, I discuss some historical trends in these socio-natural processes, in particular on how neoliberal development transforms socio-natures in different ways when compared with statist developments. I am especially interested in the historical production of ‘public water’ and subsequent waves of water privatization (Bakker, 2003, 2010).

I argue that the production of a neoliberal waterscape not only dispossess water from the abstract realms of “legal” property rights (e.g. water rights), but also from the material realms of “ecological” water sources, such as rivers and aquifers. Along with Erik Swyngedouw and John Bellamy Foster, I will frame these processes of ‘material’ water dispossession as the socio-spatial production of *hydrosocial metabolic rifts*, affecting both surface and ground water. I argue that Marx’s concept of metabolic rift, as reworked and updated by Foster (2000, 2009), offers an insightful approach to understanding processes such as the ecological depletion of rivers, aquifers, and other environmental commons such as land. I will illustrate this concept in chapter 3, wherein I analyze the relationship between forestry developments and water dispossession in the Bío-Bío region. I also illustrate the hydrosocial metabolic rift concept in chapter 4, in which I analyze dam development’s effects on local people in the Andes Mountains of Bío-Bío and Santiago.

Finally, in light of the gap in knowledge of the political ecology of water movements in Chile, this dissertation will construct an analytical framework for studying these emerging water movements. I review the literature theorizing resistance to neoliberal environments and explore alternative development projects, some of them completely antagonistic to neoliberal natures. In particular, I focus on the notion of water commons as a counter-hegemonic project (cf. McCarthy, 2005; Bakker, 2007, 2010), drawing from poststructural accounts in political ecology (Peet et al., 1996; Agrawal, 2006; Escobar, 2012; Valdivia, 2015), through which I explore regimes of truth, discourses and practices about water, development, and modernity, and subjectivities produced in the process.

In this respect, I follow the definitions of political ecology that focus the analysis on the material production of socio-spatial inequalities or uneven geographical developments. In this line, Swyngedouw states that the main goal of political ecology is “to tease out who gains from and who pays for, who benefits from and who suffers (and in what ways) from particular processes of socio-environmental change” (Swyngedouw, 2004: 24). I also follow the notion of a political ecology that seeks to transcend these inequalities, proposing emancipatory alternatives to traditional development (Peet et al, 1996: 13; Escobar, 2012) for those social groups—water subjects and water social movements—located on the losing end of these socio-environmental transformations.

In short, in this chapter I discuss the notion of hydrosocial metabolism (section 1), and how development and neoliberalization are closely associated with large-scale geographical projects and water privatization (section 2). Then, in order to understand the emerging water social movement in Chile, I discuss critical approaches theorizing processes of subjectivation and social responses to water privatization, focusing on emerging perspectives on water commons mobilized through the politics of scale (section 3).

1. Politicizing water: A relational ontology and epistemology to investigate hydrosocial metabolic processes

Socio-natural metabolic processes

According to Marx, social relations are based on a metabolic relationship between society and nature. Human labor is the assemblage that necessarily produces and reproduces socio-natural metabolic processes. Marx states, “Labor is, first of all, a

process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature. He sets in motion the natural forces which belong to his own body, his arms, legs, head and hands, in order to appropriate the materials of nature in a form adapted to his own needs. Through this movement he acts upon external nature and changes it, and in this way, he simultaneously changes his own nature. He develops the potentialities slumbering within nature, and subjects the play of its forces to his own sovereign power” (Marx, cited Foster, 2000: 157)

At the core of this socio-natural metabolism are social relations of production by which, according to Marx, objects with use values are produced by human labor using raw materials taken from nature. Marx and Engels elaborated a theory about how the labor process transforms both nature and society. The “social process” is produced through the intervention, use and mastery of nature. For Foster, the condition of possibility for developing a “revolutionary ecology” (Foster, 2000: 1) rests in the understanding of these socio-natural metabolic relationships, which are mediated by the human labor process. Human beings are an agency embedded in nature, which is transformed through the labor process and social relations of production under capitalism. The transformation of nature means the transformation of social relations as well. The significance of this theory rests precisely in that it eliminates the binary divisions between nature and society –artificially created by certain “modernity” discourses—maintaining both as a relational unity. As noted by Foster, “the importance of this approach in relation to the subsequent development of philosophy and social science cannot be exaggerated. As a form of realism, it insist[s] on a *perpetual* and close

connection between natural science and social science, between a conception of the material/natural world and the world of society. For this reason, Marx continually defined his materialism as one that belonged to the ‘process of natural history.’ At the same time, he emphasized the *dialectical-relational character of social history* and the embeddedness of human society in social praxis”. (Foster, 2000: 7, emphasis added).

Like Foster, the Marxist geographers David Harvey (1996), Neil Smith (2008), and Erik Swyngedouw (2015) have emphasized the *relational* character of this Marxist approach to socio-natural relations (Castree, 2002). These authors have developed the notion of socio-nature as a process socially produced and contextually situated. They focus on the socio-spatial dimensions of capitalism, analyzing how Keynesian, neoliberal, and other development projects expand across the globe in search of profitable lands, processes by which space is produced by capitalist investments and disinvestments (Smith, 2008). These historical-geographical developments are the main drivers of socio-environmental transformations, characterized by the expansion of capitalist social relations, class struggles, and uneven development within and across local, regional, and global geographical spaces. For this reason, one of Harvey’s major theses indicates that “all ecological projects (and arguments) are simultaneously political-economic projects (and arguments), and vice versa” (Harvey, 1996: 182). This can be extended to mean that any political-economic and ecological projects (and arguments) are simultaneously geographical projects (Swyngedouw, 2015: 7; Smith, 2008: 237). This premise sustains the production of nature thesis, which was first developed by Smith, and then reformulated by Swyngedouw as the production of socio-natures and hydrosocial assemblages, applying it to his research on water, development, and modernity in

Ecuador (Swyngedouw, 2004) and Spain (1999, 2007, 2015). In what follows, I discuss these insights from Smith and Swyngedouw as the ontological, epistemological, relational-dialectical approaches which inform my research on water struggles in Chile.

Neil Smith and Erik Swyngedouw: The production of nature and hydrosocial assemblages

Smith identifies a first and a second nature. While the first nature is represented by the use values naturally produced by the Earth (land, water, forests, etc.), second nature is represented by the exchange values produced by society (commodities). First nature is the realm of the general production of use-values. Second nature is the realm of capitalist production of both use and exchanges values, and the social institutions sustaining them. In the second nature, the socio-natural metabolic unity is maintained, but society takes on an internal differentiation from which social classes emerge, differentiation that become crystallized as a “state form”. Social institutions and rules for the society as a whole emanate from the latter, which regulates class struggles between the ruling and dominated classes. Thus, second nature is the differentiation of society into social classes, and at the same time, it is the emancipation of human beings from the constraints imposed by first nature.

“The production of a second nature has hastened the emancipation of society from first nature, and in the process has sharpened the contradiction, wholly internal to second nature, between a ruling class that is directly tied to the primitive second nature of agricultural land, and on the other side, a rising bourgeoisie whose political base is dependent on control of the market and

the town. As this contradiction develops, it becomes necessary for the bourgeoisie to extend its control to cover not just the exchange process but also the production process. [As] a product of second nature, it involves a political struggle, culminating in bourgeois revolution” (Smith, 2008: 68-69)

What Smith is saying is that the development of social classes—and the class struggles between them—are the main elements of capitalist society or second nature. In this sense, the Earth is transformed into the main means of production because under capitalism what really matters is the production and reproduction of surplus value. This basically means that nature is transformed into profit for capital and “becomes a universal means of production” (Smith, 2008: 71). In other words, whole environments or ecosystems become transformed into commodities, gradually changing in status from use-values to exchange-values. Water is one example of this process of the production of nature (Swyngedouw, 2015). However, the processes of transformation of nature into capital and money are driven by capital’s need for profit, not by the needs of society. These processes can be traced back to the European ‘discovery’ of the Americas in 1492 and the different industrial revolutions of the 18th and 19th centuries (Marx, 1990; Glassman, 2006). In a capitalist society, exchange-values and markets become the dominant social form, wherein both first nature (non-human) and second nature (humanly created) are completely intervened upon by human agency (Smith, 2008: 81).

In other words, Smith argues that under capitalism the production of nature becomes the dominant process that involves the socio-natural metabolism under the logic of markets and exchange values. A key problem here is how the process of private

appropriation of nature is confronted with traditional ways to understand nature as essentially a use value instead of exchange values. According to Harvey (2014), private property rights over nature can be eventually overcome them by mobilizing new forms of collective property over nature and other social rights. This strategy would transform the contradictory social relations of production, from the form of private property towards one of common property. According to Smith, the real questions are how we produce nature and who controls this production. Therefore, the production of nature “in many ways it is a struggle to control what is socially necessary [...] [and] to judge necessity according not to the market and its logic but to human need, according not to exchange-value and profit, but to use-value” (Smith, 2008: 89). These concepts are relevant to understand my arguments in regards to proponents and opponents of water privatization and water markets approaches in water governance (see below and Chapters 5 and 6). It is the contradiction between production for profit vs. human needs which leads Smith to argue that the production of nature idea is essentially about political action (Smith, 2008: 90).

Swyngedouw picks up Smith’s thesis on the production of nature as an entry point to study the “production of new socio-natural assemblages and constellations” around water as a political entity (Swyngedouw, 2015: 7). For Swyngedouw, water is political because it is always embedded in development strategies. He applies the Harvey’s thesis that “all ecological projects are also political projects”, arguing that is “precisely this thesis that renders water inherently political, and therefore contentious, and subject to all manner of tensions, conflicts, and social struggles over its appropriation, transformation, and distribution, with socio-ecologically unevenly partitioned consequences”

(Swyngedouw, 2015: 20). For Swyngedouw, water is a socio-natural metabolism, in which “the hydrosocial landscape is viewed as an assemblage of interwoven processes that are simultaneously human, nonhuman, material, discursive, mechanical, and organic, but ultimately driven by political forces and economic processes that aspire to turning nature into capital, a process that necessarily implies changing social relations to nature” (Swyngedouw, 2015: 21). Here Swyngedouw follows Smith’s idea that the production of nature means basically the commodification of nature and its transformation into capital. Like Smith, Swyngedouw also considers that this process is always open to the political struggle because it is “contested and contestable” (Swyngedouw, 2015: 23). The author adopts Lefebvrian idea of “hybridization” as an internal component of the historical-geographical processes of production of socio-natures. In this way, the analysis of hydrosocial assemblages considers hybridization as “a process of production, of becoming, and of perpetual transgression”, firmly based in a “process-based episteme” in which everything is eternally flowing and changing (Swyngedouw, 2015: 22). Both the flows of water and social power are, in this sense, continuous and always relational. Therefore, the archaeology of particular hydrosocial assemblages “requires constructing multiple narratives that relate material practices, representational visions, and symbolic expressions” (Swyngedouw, 2015: 21). Epistemologically, this is a ‘hybrid’ approach to water, both materialist and constructivist, also known as a *realist constructivist* approach to socio-ecological relations (Foster et al, 2010: 340).

In this respect, Swyngedouw also establishes a dialogue with poststructuralist approaches that bring new “concerns with knowledge-power, institutions, and regimes of truth” (Peet et al, 1996: 2). Swyngedouw’s approach actively engages with these eco-

governmentality approaches to political ecology, mainly based on the ideas of Michel Foucault (Valdivia 2015). In doing so, Swyngedouw points out that discourses emanating from particular hydrosocial assemblages are constitutive elements of their production processes. Therefore, “regional discursive formations” (Peet et al, 1996) must be seriously considered during the analytic reconstruction of the production processes for specific hydrosocial assemblages.

Swyngedouw’s approach offers three main elements for the political-ecological analysis of hydrosocial assemblages: knowledge, processes, and multiple entry points. First, Swyngedouw affirms that “transformative knowledge about water and the waterscape can only be gauged from reconstructing its processes of production” (Swyngedouw, 2015: 23). There are no given hydrosocial assemblages: only by excavating its historical-geographical (and ethnographic) processes of production will one be able to uncover and understand the different forces (human and non-human) acting on the construction of such hydrosocial assemblage. Second, for Swyngedouw this means to focus on the analysis of processes instead of structures or static things. Following Harvey’s relational dialectics, the emphasis is on “the understanding of processes, flows, fluxes, and relations over the analysis of elements, things, structures, and organized systems” (Harvey, 1996: 49). Third, the Swyngedouw’s approach assumes that any ‘thing’ (e.g. material practices, discourses) can be taken as the entry point to studying specific hydrosocial hybrids. This is so because “as every quasi-object/cyborg/hybrid internalizes the multiple relations of its production, ‘anything’ can be entered as the starting point for undertaking the archeology of her/his/its socio-natural metabolism” (Swyngedouw, 2015, p. 23).

My interest is to mobilize the production of nature thesis as a general approach to investigating the context-specific, situated production of hydrosocial assemblages, for instance on the scale of a river basin, but considering its interrelationships with other “multiscalar hydrosocial governance” configurations, such as at the state and global scale (Swyngedouw, 2015: 33). In doing so, the researcher will uncover the processes that have contributed to producing specific hydrosocial configurations, outlining their contours, conflicts, and maybe future scenarios. Under these theoretical lenses, this dissertation can be considered as an archaeology of Chilean hydrosocial assemblages. I will consider the state development and neoliberalization processes as entry points to beginning my archaeology of Chilean hydrosocial assemblages in the Biobio and Santiago regions. In doing so, I will take into account the fact that “development”, whether it be liberal, Keynesian, socialist, and neoliberal, plays an important role in cultural and social domination (Escobar, 2012: vi).

Overall, Swyngedouw’s approach to socio-natures and hydrosocial assemblages is a non-essentialist (Escobar, 1999), process-based episteme by which one can reconstruct the particular trajectories of hydrosocial relations as constitutive agents of development and modernity (Swyngedouw, 2015: 24). While for Smith the production of nature becomes a concept for political action and class struggles, Swyngedouw applies this thesis to investigate hydrosocial assemblages or the relationships among water, modernity, oppressive and (sometimes) emancipatory development projects (Swyngedouw, 2015: 23). This raises the question of how specific trajectories of hydrosocial developments have taken place in specific local and national socio-

environmental contexts, under specific developmental states and ideologies, such as modernity, equality, and developmental discourses. I discuss these issues of water, development, and modernity in the next section. I engage with insights on how the state, markets, and communities have historically participated in the production of hydrosocial assemblages.

2. Historical-geographical developments of hydrosocial assemblages: State, Markets, and Communities

Water, development, and modernity: State

Modernity aims to produce citizenship, which means producing subjects with certain rights. According to Bakker (2010), water is one of these “material emblems of citizenship” in modern times. Following the historical-geographical materialism of Harvey, and Swyngedouw’s notion of water as a hybrid, Bakker argues that “the experience of modernity is intimately, viscerally associated with water” (Bakker, 2010: 54). The processes of water modernization—in other words the mobilization of money, political power, labor force, technologies, and natural assets needed to provide water to people—began at the end of the 19th century. This was done through several development strategies deployed by local elites through the nascent nation-states across the globe (Swyngedouw, 2005, 2015; Bakker, 2010). According to Bakker, since the second half of the 19th century, water has been at the core of development strategies in different nation states. It was not surprising, then, that during the last decades of the nineteenth century both private and state water projects appeared, including dams, irrigation networks, potable water and sanitation services. These developments meant the

construction of large-scale networks of pipelines, dams, irrigations canals, sewage systems, and other water-related works, principally in urban areas. However, Bakker notes that at the beginning of the 20th century, private participation in the construction of new water networks was reduced, and the state took a dominant role in promoting modernity through the provision of water to citizens. Bakker argues that the main reason why the new “state hydraulic paradigm” (e.g. hydro Keynesianism in the US West) eventually dominated hydrosocial relations was the large amounts of capital required to construct different water works, with few or no return in the short-term, which is obviously unattractive from the perspective of private investors looking for profit (Bakker, 2010: 85). For this reason, centralized states and municipalities took a lead role in constructing “public” water supply networks. The state hydraulic paradigm was born. Underlying these state water projects was the notion that the “water supply was a material expression of political inclusion [...] [what] underpinned, in part, the massive growth in the size of welfare states in the twentieth century” (Bakker, 2010: 55). Modern nation-states were fueled by these ideals oriented to producing subjects with the right to water, particularly after economic crisis of 1929.

In this sense, main symbols of the water modernization processes undertaken by developmental states during the 20th century were large-dam projects. All around the world, developed and developing nations began the construction of large dams, oriented towards both the production of hydroelectricity and the accumulation of water for irrigation in reservoirs. All this infrastructure was directed towards fueling the increasing industrialization process by providing electricity, which according to Bakker is other material emblem of citizenship, to the growing urban populations and industries. During

the 20th century, dams symbolized modernity (Worster, 1992; Nüsser, 2003; Kaika, 2006; Bakker, 2010; Swyngedouw, 2015). However, as remarked by Bakker, the power produced by dams, along with other networks and other large-infrastructure water projects, was historically oriented only toward the middle and upper classes in urban areas. The urban poor slums, known in Chile as poblaciones callampas or campamentos, and the majority of rural populations were excluded from these modern emblems of citizenship.

However, these rural communities historically developed their own artisanal and locally managed water systems. As Bakker argues, the large scale geographical projects developed by the welfare states, such as dams and irrigation reservoirs, actually co-existed with these alternative, community-led water systems. (Bakker, 2010: 39). These insights are significant for this research because, as I will demonstrate throughout this dissertation, in Chile these large geographical projects (i.e. forestry, dams, and irrigation) have historically co-existed with the vast spectrum of artisanal and community managed water systems in rural areas.

In sum, water modernization and all the associated large-scale hydraulic projects were predicated under the corporate power of welfare states, oriented towards producing subjects with the right of access to water while making use of a Keynesian approach in which water was gradually defined as a public good. This notion of water as a public good, in which water was “viewed as a material emblem of citizenship: a symbol of political inclusion” (Bakker, 2010: 218), underlined the dominant development strategies during the twentieth century (Swyngedouw, 1999, 2007, 2015; Bakker, 2010). However, since the 1980s public water would be privatized, and in parallel, many stated-owned

industrial assets would be transferred to domestic and transnational corporations. I now focus on what this neoliberalization process means to water resources.

Neoliberalizing water: Markets

Neoliberalization and the privatization of public goods/assets are almost synonymous. Public goods are generally referred to as those material and cultural emblems of citizenship (Bakker, 2010) or collective property rights (Harvey, 2003) deployed as a result of modernity by welfare states in order to produce modern citizen subjects. The neoliberalization process began with the capitalist crises from the 1970s and onwards, from which several rounds of devaluations and privatizations of these public goods emerged. According to Smith and Harvey, these processes of devaluation and privatization are at the core of the neoliberalization process, and they are also central factors in producing uneven geographical development (Harvey, 2005; Smith, 2008). In practice, as noted by Castree (2008) and Bakker (2003), the neoliberalization process, which is understood as the transference of public assets to the corporate private sector, has occurred through the politics of de-regulation and re-regulation undertaken by political elites, capitalist elites, and the state. Here the class struggle issues become relevant because these political elites represent the ruling classes' interests, which are frequently intertwined with the interests of international institutions such as the World Bank (WB) and the International Monetary Fund (IMF). These institutions have gained momentum from the 1970s onwards, practically obligating national governments to privatize the public goods through structural adjustment programs, including water, created during the welfare states. To do so, states have created new laws and institutions

to legally proceed with this transfer of public water to the private corporate sector. This is what the political-ecological literature calls re-regulation: the creation of institutions and public policies to regulate the installation and functioning of the private companies in the new commoditized sectors (Castree, 2008: 141; Swyngedouw, 2005: 89-90; Bakker, 2003: 50; Bakker, 2010: 88).

In Latin America and Chile specifically, these processes of re-regulation and privatization began during the 1970s, under the umbrella of the Washington Consensus (Stiglitz, 2002; Dos Santos, 2003; Bakker, 2010; Escobar, 2012). In effect, after Pinochet took power on September 11th of 1973, he enabled the Chicago Boys to re-regulate the state and create the conditions for the privatization of the commons. Harvey (2003) calls this neoliberalization process accumulation by dispossession, similar to what Marx called primitive accumulation (Marx, 1990). However, Harvey (2003) argues that dispossession was not only a process that occurred during the formation of capitalist social relations, as examined by Marx in *Capital* vol. 1, but has been a general strategy of the capitalism that has developed during the twentieth century, especially from 1973 onwards (Glassman, 2006). At that juncture, the ‘fix’ for a growing capitalist accumulation crisis was to make further inroads into the commodification of public goods, including water.

“The corporatization and privatization of hitherto public assets (such as universities), to say nothing of the wave of privatization of water and public utilities of all kind that has swept the world, indicate a new wave of ‘enclosing the commons’ [...] The reversion of common property rights won through years of hard class struggle (the right to state pension, to welfare, to national health care) to the private domain has been one of the

most egregious of all policies of dispossession pursued in the name of neoliberal orthodoxy” (Harvey, 2003: 148)

Bakker (2003, 2010) describes the process of water privatization as the transition from the 'state-hydraulic paradigm' to one of 'market environmentalism' driven by the private sector. She notes that this transition moves forward at two levels, one theoretical and the other ideological struggle. Whereas previously, Keynesians would theorize about “market-failures”, current neoliberal orthodoxy (e.g. Hayek, von Mises, Friedman) focuses on “state-failures”. These state failures were among the main arguments deployed by proponents of water privatization to justify, at the level of practice, the transfer of public water to the private sector (Bakker, 2003, 2010).

Water privatization “is a process of expansion of the market, which creates new property relations and in so doing generates new society-nature relations” (Bakker, 2010: 107). The implications of water privatization are not just restricted to the legal arena of property status in the shift from state to private, but also to the status of citizens. These are no longer subjects with social rights, but “consumers” of new products, in this case commoditized water. The modern citizen who previously possessed the right to water becomes transformed into a consumer in the water market. This shift has significant political consequences as now the struggles are between consumers and private companies rather than between citizens (with rights) and the welfare states, as in the past. However, this does not mean that the state disappears from the water arena. As noted by Castree (2008), Harvey (2003) and Bakker (2003), the state transforms itself by taking on new functions in neoliberal capitalist accumulation. As I will demonstrate in the Chilean

case (particularly in chapter 3: forestry), the state becomes one which subsidizes, which transfers subsidies to promote the ‘economic sustainability’ of private corporations operating in the new commoditized sectors. This can be framed as a new form of dispossession of public property, which illustrates Harvey’s assertion that dispossession is a continuous process.

In analyzing these processes of water dispossession in contemporary societies, Swyngedouw (2005) highlights their profound consequences in the power relations among different social groups involved in the water sector. As he notes “privatization has resulted in a profound re-regulation of the water market and the emergence of considerable quasi-governmental regulatory structures. In the process, the set of social actors involved in the institutional and regulatory framework of the water sector has been significantly altered, with a new geometry of social power evolving as a consequence” (Swyngedouw, 2005: 89-90).

This includes urban areas, but also peri-urban and rural communities. As Bakker points out, the neoliberal reforms in the water sector were directed almost exclusively towards the water supply and sanitation sectors in urban areas. As mentioned above, these large-infrastructure networks in urban areas were constructed in a context in which a diversity of rural and peri-urban artisanal water systems already existed, particularly in developing countries like Chile. These artisanal water systems are typically managed by individuals and organizations locally embedded into the rural communities (Bakker, 2010: 107). These rural social groups are the ones most affected by the process of water privatization, because “water privatization has the potential to result in significant impacts on environmental quality” (Bakker, 2010: 196). In the next section, I frame these

processes that cause the environmental degradation of water through the proposed concept of hydrosocial metabolic rifts.

Neoliberalizing water and hydrosocial metabolic rifts: Communities

Bakker's assertion that "water privatization has the potential to result in significant impacts on environmental quality" is representative of the more general assumption that capitalist accumulation produces environmental degradation across scales (Foster et al, 2010; Robbins, 2012). According to Robbins, the environmental degradation and marginalization thesis in political ecology can also be understood, in part, as the general transition from Keynesianism to neoliberalism, in which "otherwise environmentally innocuous production systems undergo transitions to overexploitation of natural resources on which they depend as a response to state development intervention and/or increasing integration in regional and global markets. This leads to increased poverty and, cyclically, increasing overexploitation" (Robbins, 2012: 159). Bakker and Robbins concur on this point: both state and private water projects can create processes of overexploitation of natural commons and cause increasing damage to both the environment and the people. This notion of environmental degradation and marginalization proposed by Robbins also considers how the neoliberalization of nature and water is internally related to the broader processes of the dispossession of common property such as land and water. In this context, traditional forms of life and all the practices of "sustainable community management [are] hypothesized to become unsustainable as a result of efforts by state authorities or outside firms to enclose

traditionally collective property or impose new foreign institutions” (Robbins, 2012: 159). This reconfiguration of socio-natural metabolic processes under corporate power (state or private) highlights the socio-environmental tensions that arise between the states, private corporations, and communities under the processes of the neoliberalization of nature and water. As I will illustrate with the Chilean case, the private sector becomes the dominant actor in the new privatized regime of water management. In the drive for capital accumulation and profits, large extractive economic activities both degrade the environment and marginalize people.

As a means to contributing empirically to this area, in this dissertation I consider environmental degradation processes using through the notion of metabolic rifts proposed by Marx and reworked Foster (2000, 2009). Simply put, this notion is based on the assumption that under capitalism, there is an increasing separation of human beings from their natural environments, as in alienation.

As Marx wrote: “It is not the unity of living and active humanity with the natural, inorganic condition of their metabolic exchange with nature, and hence their appropriation of nature, which requires explanation or is the result of a historic process, but rather the separation between these inorganic conditions of human existence and this active existence, a separation which is completely posited only in the relation of wage labor and capital (cited by Foster et al, 2010: 241)

Following this idea of separation of people from their access to their natural environments, a political ecology of water struggles must certainly analyze how that separation is socially produced through political struggles at different socio-spatial scales. In rural and peri-urban areas, which will be my focus in the next chapters, this separation

means a rupture in the historical socio-natural metabolism by which humans, here represented mainly as peasants and small-farmers, have historically interacted with their natural environments, particularly with their water sources such as rivers and aquifers. This rupture, I will argue, is being caused by the processes of land and water dispossession that began with the Pinochet dictatorship and counter-agrarian reform. Aligning these arguments with the Swyngedouw's notion of hydrosocial assemblages, I propose the notion of hydrosocial metabolic rifts. By this I mean there is an increasing separation of rural communities from their water sources and access to water. The geographical spreads of these hydrosocial metabolic rifts are among the main triggers of local resistance and emerging water social movements.

3. Resistance to dispossession: subjectivation, water as a common property, and the politics of scale in water governance

In light of these processes of privatization of natural commons like land and water, there are different social movements resisting dispossession all around the world (Harvey, 2003; McCarthy, 2005; Escobar, 2012). According to Martinez-Alier (2014), local resistance often arises in response to resource extraction from local environments. Local people, mostly the rural poor and indigenous people, are defending the natural resources that their livelihoods depend on, such as land (Adnan, 2013; Martinez-Alier, 2013; Bernstein, 2010) and water (Swyngedouw, 2005; Bakker, 2010). This resistance (the “inevitability of revolt”) is an expected process caused by the production of neoliberal natures (Smith, 2008: 85) and dispossession of common property rights (Harvey, 2003, 2014). I suggest that the development of alternatives to water

privatization comes from individual and collective processes of subjectivation under neoliberalism, what in turn is creating a multi-scalar water movement that seeks to recuperate water as common property.

Subjectivation and new water subjects in response to water privatization

Subjectivation is the process by which authority and its exercise of power create new types of subjectivities and governance dynamics. It is the process “through which we are subjected, and actively take up as our own the terms of our subjection” (Manuel-Navarrete et al, 2015: 561). This notion of subjectivation expresses the double meaning of the subject, “subject to someone else by control and dependence; and tied to his own identity by a conscience or self-knowledge” (Foucault, 1982: 781; see also Deleuze, 1988). This notion of subjectivation is useful to understand the process by which people affected by water privatization have been constituted as water subjects. The “authority” in relation to water privatization can be understood as the laws and other institutions that have been created under the new market’s water governance (Bakker, 2010). In this way, I argue that the new water subjects (in particular water movements) have been constituted as such through their resistance and growing “anti-authority struggles” (Foucault, 1982: 780) directed against the laws and institutions sustaining the process of water privatization. Both the new institutions (governmentality) and resistance (agency) (Manuel-Navarrete et al, 2015: 651) produce what Agrawal calls new environmental subjects, that is, “people who have come to think and act in new ways in relation to the environmental domain being governed” (Agrawal, 2005: 7). In this research that domain

is water. That is, water privatization has worked to produce a new subject: the water subject. Therefore, water subjects can be defined as the people who have come to think and act in new ways in relation to the process of neoliberalizing water. I suggest that they have come to think in water as a commons instead of water as a commodity (cf. Bakker, 2007)

Struggles to recuperate water as a common property

In this dissertation, I make use of the notion of water commons (Bakker, 2007, 2010; Robinson, 2013; Swyngedouw, 2015) as a general strategy to analyze the process of the production of new water subjects in Chile. They are representative of these diffuse but still concrete global, national, and local “calls for the new commons” (McCarthy, 2005). During the last three decades, diverse scholars from different perspectives, such as liberal (Ostrom et al, 2012) and critical-Marxists (Hall, 2014), have been making use of the terminology of commons as a general strategy to understand the role of communities in the management of collective property. This includes environmental commons such as forests, water, and irrigation systems. All of them are deploying the concept of commons as a general strategy for reaction and resistance to privatization and commodification of collective property under neoliberalism (McCarthy, 2005: 11). As Bakker argues, resistance movements to water privatization “in many instances [are] also linked to resistance to markets (and capitalism) in a broader sense [...] attempt[ing] to re-embed private sector activity within society, through reimposing social constraints on markets and private firms” (Bakker, 2010: 139; see also Watts, 2007). In this context, “commons” are a general strategy used by new social movements as a mean to construct alternatives

to neoliberal globalization (“alter-globalization”) (Bakker, 2007, 2010). This strategy has been gaining momentum during the last three decades, particularly in Latin American countries, wherein there exists a long history of anti-imperialist tradition and alternative proposals for development (Bakker, 2010; Escobar, 2012; Vitale, 1980; Salazar, 2012).

In mobilizing water commons, water is defined as “public good or trust”. In contrast, when understood as commodity, water is defined as “economic good”. In terms of regulation, water as a commons is state-led while water as commodity is market-led. Finally, when water is understood as a commons, the manager can be either the state or the community, but when understood as commodity, the manager will be private companies and the market (Bakker, 2010: 182) and will privilege the wealthy.

The centrality of this debate in Chile is reflected in the following. The emerging water subjects involved in current water struggles are seeking to change the current status of water from a commodity to water as public good. They do not seek to recuperate the same historical form of public water from the past. Instead, they are trying to construct a new historical form of water as a commons considering the current scenarios dominated by neoliberal hydro-modernity. The debate has also been framed as the *nationalization of water* (Larraín, 2012; Bauer, 2013). Water as a public good proceeds from the assumption that the state must regulate water in the public interest. This is in contrast to the current situation in Chile in which water is legally a public good but can be (and is) privatized. This shows that mobilizing water commons means raising questions about the property rights related to water. This is the core discussion in Chile because public property rights over water were privatized through the 1980 Constitution and 1981 Water Code, with water property rights granted in perpetuity. After more than thirty years,

corporate power controls almost all the water rights in Chile, both consumptive but particularly non-consumptive (Larraín, 2012).

Chilean water is not a public good anymore. Specifically, this transfer of collective water rights from the state to the private sector is being contested by communities and emerging water subjects across different scales in the nation. In other words, communities are demanding to recuperate water as collective property. This means a de-commodification of water, which implies the transformation of private property rights into collective property rights again. Water commons raise serious challenges to the hegemonic notion of private water rights. In this respect, Bakker asserts that “property is not a fixed object framed by economic rationality; rather, it is a social relation that can evolve over time, in which different institutions and power relations are at work” (Bakker, 2010: 174). The water rights granted in perpetuity are not “naturally perpetual”, as their proponents (the Chicago Boys) want them to be, because they can be reframed as collective property through political struggles and processes of social mobilization, which are antagonistic to this market approach to water. In this respect, the notion of water commons can be viewed as a “truly counter-hegemonic project, [a] reminder that property relations are social, not natural, and that profoundly alternative social relations and values are entirely thinkable” (McCarthy, 2005: 16).

Water commons and the politics of scale

One theoretical pathway to frame these processes of political struggles is the “politics of scale” or “hydrosocial-scales” (Brown et al, 2005; Bulkeley, 2005; Smith, 2008; Swyngedouw, 2015). Applied to water struggles, the politics of scale emphasizes how the

social mobilization for water (commons) can begin at local levels and then be dynamically extended to regional, national, and global scales (Bolin et al, 2008; Norman et al, 2015).

In this sense, three theoretical principles orient the scalar politics research: 1) scale is socially constructed; 2) scale is both fixed and fluid, and 3) the scale is a relational idea (Brown et al, 2005: 609; Norman et al, 2015: 5). First, the scales are socially constructed through socio-spatial struggles (Bolin et al, 2008: 1497; Swyngedouw, 2015: 30), whose results sometimes produce a significant scalar reconfiguration for the actors involved in these power struggles, who seek to concrete their political agendas, here represented by the struggles to recuperate water as a common property. The results of this struggles—whatever they are—are not "the inherent qualities of particular scales" (Brown et al, 2005: 609), but the product of the mobilization of people to position their political agendas in certain areas of social activity and public policy (MacKinnon, 2011, 29). In this case, water commons against water markets. Second, precisely because the scales are socially constructed from ongoing political struggles, scale has fluid qualities, that is, it focuses on the analysis of processes rather than static entities (see section 1 above). However, these political struggles between different actors can be eventually fixed and "routinized into relatively enduring and hegemonic structures for certain periods of time" (Brown et al, 2005: 610). In this context "new scalar arrangement and configurations [develop] at the point of interaction between inherited and emergent projects and scales" (MacKinnon, 2011: 31). While these hegemonic scalar arrangements (e.g. water privatization) can "shape future possibilities for social action, they do not determine the possibilities" (Perreault, 2015: 117). Third, the scales are relational because scale analysis

involves putting the focus on the relationships between scales, without favoring any scale, for example, the local one. Each scale is related to the others, but those relationships are open to social constructions. Therefore, the analysis of scale "must examine a range of scales at once (rather than focusing on a single scale alone), and they should specifically interrogate the changing interrelationships among various scales" (Brown et al, 2005: 610)

The latter is significant to analyze the scalar politics of water struggles because often it is assumed that the "natural" scale represented by the river basin is the "most appropriate" level of scalar analysis in relation to hydrosocial processes (Norman et al, 2015; Swyngedouw, 2015). However, this idea is challenged by the theoretical principle that the scales are relational and mutually constitutive. This means that the river basin's scale is influenced by smaller scales, such as those of community, local governments, among others. At the same time it is influenced by larger scales, such as the national and global. In other words, "the scale of the river basin and its hydro-political configuration is indeed a vitally important territorial form of water governance. Its contested formation and internal dynamics cannot, however, be abstracted from its position within the wider operation of the state and its relation to international water regimes and policies" (Swyngedouw, 2015: 32). These multi-scalar water struggles will be illustrated through the environmental, anti-dam, and other emerging water movements claiming water as a commons (chapter 6). This is the fundamental reason why I develop a historical-geographical and ethnographic approach to understanding and explaining water struggles in two different regions of Chile, Biobio and Santiago. That is to say, studying more than

one site will allow me to investigate the linkages between local struggles across different but interrelated geographical scales (Swyngedouw, 2009, 2015).

At the global scale, experiences of growing coalitions grouping anti-privatization and anti-dam movements have configured emerging global red-green alliances, composed by a diversity of non-profit stakeholders, such as the labor movement and unions, peasants and small-farmers, environmentalists, NGOs, as well as antipoverty, religious, and other alter-globalization social movements (Conca, 2006; Bakker, 2010: 137). In broader and prospective terms, the scalar articulation of these international coalitions with local and national water movements proposing other pathways of development, are promising because “the forging of such alliances would mark the rise of socialist ecology as a world-historical force, and the onset of the struggle that is likely, more than any other, to define the course of the twenty-first century” (Foster et al, 2010: 211). In chapter 6, I specifically analyze how international coalitions (particularly anti-dam and anti-privatization) influence local and national water movements in Chile, in particular through the water commons notion as strategy to reconstruct public water (Bakker, 2010). Paraphrasing Smith, the revolt against water markets is against the notion of water as exchange value and to recover the notion of water as a use value. In short, I propose to create an archaeology that reconstructs the socio-natural metabolism of the growing social water movement in Chile. Following in the footsteps of Smith and Swyngedouw, I explain how these new water subjects are struggling to reconfigure the neoliberal hydrosocial assemblage through their use of, both in discourse and practice, the notion of water commons. I frame water commons as an oppositional narrative and activist strategy against the neoliberal and hegemonic regime of water as commodity or private property

(Bakker, 2007). Currently, movements to reframe water as a public good are trying to change this market oriented approach to one focused on the public domain of water, oriented to satisfying social needs, as opposed to capitalist needs for profit. Therefore, Chile presents a compelling historical-geographical case in which to investigate how struggles over water can contribute to emerging democratic modes of water governance (Swyngedouw, 2009, 2015; Bakker, 2010).

Summary

Let me summarize the theoretical arguments made until now. First, I begin from the assumption that the socio-natural metabolism expressed in the hydrosocial assemblages is a unity produced socially through the historical and geographical mobilization of social power struggles among different social groups. Second, these socio-spatial struggles are associated with the deployment of different geographical (ecological) or development projects, which in turn are the main drivers of hydrosocial changes. Water is embedded and is intrinsic to these geographical projects. During the 20th century, developmental states produced modernization processes of supplying water to people who mainly lived in urban areas, while rural communities developed parallel artisanal water systems, which in turn were framed as a material emblem of citizenship and modernity. Access to water was depicted as a symbol of political inclusion. In the process, different subjectivities and public notions of water unfolded. However, during the 1970s, these processes of developmental states constructing public goods and public water were gradually dismantled by the processes of the neoliberalization of nature and water privatization. Market approaches become hegemonic in different spheres of society. Water was transformed into a commodity and degraded ecologically. Third, the social responses to

these water market and hydrosocial metabolic rifts have come from different water subjects who have been directly and indirectly affected by the processes of water dispossession. These water subjects have begun to articulate in growing water movements and they are producing a new national hydrosocial scale by making use of the notion of water commons as a counter-hegemonic project. The goal is a more sustainable and democratic regime of water governance.

CHAPTER 3

THE PRODUCTION OF SOCIO-NATURE IN BIOBIO: FORESTRY DEVELOPMENT AND THE NEOLIBERAL EXPANSION OF HYDROSOCIAL METABOLIC RIFTS IN THE ITATA RIVER BASIN

“Landless peasants, smallholders and landowners alike, workers and capitalists, political affiliations and visions of what is right or wrong, a wide range of institutional constellations, geopolitical tensions and alliances, the heterogeneous physical and ecological acting of water and all sorts of other non-human things and organisms, and much more, coalesce in the production of the hydroscape, the hydrosocial assemblage that captures, transforms, metabolizes, moves, and distributes water to quench the thirst of cities, to fertilize the fields, and to permit all manner of other production processes to unfold”

Erik Swyngedouw, 2015, p. 25

“Marx employed the concept of metabolical rift to capture the material estrangement of human beings in capitalist society from the natural conditions of their existence.

[This] was to argue that basic conditions of sustainability had been violated”

John Bellamy Foster, 2009, p. 182

“Forestry is the drought”

Sol, peasant without water, 2014¹

¹ Interview by the author on September 15, 2014, Portezuelo’s commune, Biobio

1. Exploring the production of nature in Chile: 1870-1930

To analyze the development of forestry's projects in Biobio and its relationship with current trends in water scarcity (Montalva et al, 2005; Huber et al, 2010; Stehr et al, 2010), it is important to investigate the historical-geographical context in which Chile was immersed during the last decades of the 19th century when the forestry project began to be envisioned and developed (Clapp, 1995; Camus, 2006; Klubock, 2014). These decades were very important for the future developments of capitalist modernity in the nation. Therefore, this period is relevant to understanding and explaining the production of nature, which is associated with different geographical projects that Chile adopted throughout the 20th century. Based on the ideas of Harvey, Smith and Swyngedouw as outlined in the theoretical framework, I begin with the assumption that the capitalist modernization process means the radical transformation of biophysical environments and water flows, and therefore the production of new natures and power social relations among social classes and groups.

The hacienda system

The rural social dynamics and class structure in Chile during the last decades of 19th century were still configured by the *hacienda* system, which originated during the Spanish colonial era (1500s-1810) and which remained as the dominant social structure until agrarian reform unfolded during the 1960s. For this reason, Chilean historians have defined the *hacienda* system as the oldest and most central social structure producing social stratification, that is, as one of the main sources of social power in the nation (Bengoa, 1988). The *hacienda* was a large tract of land, but only a small percentage was

actually used for agricultural production. Only during the second half of the 19th century was the *hacienda* system consolidated as a productive agricultural unit. This happened after the opening of wheat and other agricultural markets in California and the Pacific, which in turn triggered water works that contributed to the construction of the main networks of irrigation canals in central Chile (Bengoa, 1988: 16, 173-186)². This meant the consolidation of *semi-feudal* social relations between the landowner (also known as *terrateniente*) and the *inquilinos*, the resident estate laborers working in agricultural activities performed within the *hacienda*, which was also known as *latifundio* or *fundo*. I emphasize *semi-feudal* because some historians argue that hacienda landowners in Chile (and Latin America) always had capitalist (commercial) relations with the metropolis (Spain³) during the colonial era (15th century until Chilean independence in 1810). After independence, this mercantilist system continued (Salazar, 2012). However, within the haciendas, landowners did not have capitalist social relations with their workers because their relations of production were not based on free contracts, which in practice meant that wages were only partially paid in cash (Moulian, 2006: 13; Bellisario, 2006). This has been considered a “pre-capitalist” social relationship between the landowner and his labor force, the *inquilinos* (Vitale, 1980).

Although during the colonial era the *inquilinos* were originally independent peasants working on their own small plots or rented land, during the second half of 19th century they were finally dispossessed of their independence, gradually being transformed into a

² See chapter 4

³ Or other imperial powers in Latin America, such as Portugal, France, and England.

subordinate labor force working under pre-capitalist labor conditions within the haciendas (Salazar, 1985; Bengoa, 1988). The *inquilinos* were cheap labor to the *patron* (landowner), who only paid around 20% of their salary in cash. The other percentage was paid through *regalías*, or the allocation of a small plot of land (around one hectare) to the peasant and his family to produce crops for both subsistence and often surplus for local markets. This was only a right to use this plot, not right to own it as property (Bellisario, 2006). This plot also contained the peasant's dwelling. In addition to providing his own labor to the landowner, the peasant (head of the family) had to provide for free the labor of one of his sons to the patron for part of the year during the harvest seasons. Nonetheless, the *inquilinos* and their sons were not a sufficient labor force within the haciendas. For these reasons, the landowner was obligated to hire external workers to satisfy the entire *hacienda's* labor requirement during the agricultural and irrigation seasons.

The need for more workers triggered the historical formation of a third social stratum around the *hacienda* system aside from the landowners and the *inquilinos*. This third social class is known as *peones*, seasonal laborers composed of peasants and lower class individuals and groups who did not reside on the rural haciendas, but served only as a temporary labor force during the harvest seasons (Bengoa, 1988). When the harvest season finished, *peones* often returned to work as proletarians in mining activities in the north, combining these activities with vagrancy within the central valley. The *peones*—also known as *rotos and gañanes*—were subjects without a fixed residency who lived in constant movement among different jobs and territories, from the northern mines to the emerging urban industries and to the haciendas in the center-south of the country. These

subversive subjects, as seen by the ruling classes, represent the historical roots of the *popular class* in Chile. This popular class has gradually taken shape since the last decades of 19th century through the assembling of different factions of the most marginalized rural and urban social groups, along with other groups who are more integrated in the growing processes of capitalist modernization. The latter include social strata such as the urban working class organized in unions, student federations, artisans, producers, and factions of middle and intellectual classes, among others (Salazar, 1985, 2012).

State power and class struggles

In this way, the *hacienda* system represented the exercise of social power from the side of the *landowner* over both *inquilinos* and *peones*. The landowner's social power in the haciendas was extended further as a form of political power in the parliament and central government located in Santiago. This means that in addition to the power exercised within the hacienda, landowners also controlled political and state power during the late 19th century and the first decades of the 20th.

“The agro-state mechanism [was] simple: the hacienda and the landowner's family monopolized extensive land resources and therefore *inquilinos*, who "lived and died" within the estate. They also controlled other smallholders and rural villages dependent on their favors. The so-called *latifundio-minifundio* [estates-smallholdings] complex was a labor system (captive labor market) that functioned as a closed social system dominated by landowners. The electoral system did the rest: the overrepresentation of rural

provinces with respect to urban centers gave landowners a strong presence in the parliamentary system” (Bengoa, 1988: 12)⁴

The *inquilinos* and other independent peasants and smallholders living around the haciendas were all captive to the landowner’s patronage. They were practically obligated to vote for the landowner to make ensure his powerful political position in the parliament. Once there, they began to benefit from the state’s resources and political influence (Bengoa, 1988). Under the hegemonic power of this ruling class of landowners, which was power shared in part with other local (and British) capitalists enriched by the *salitre* (nitrate) in the north, the emerging “liberal state”⁵ guided the nation toward the “War of the Pacific” against Peru and Bolivia in the north (1879-1884), and against indigenous people (Mapuche) in the south (1881-1927). Once finished, these wars extended Chilean sovereignty over territories to the north⁶ and to the south, respectively. The liberal state became an imperial power led and mobilized by oligarchic interests, and it was represented by landowners who controlled haciendas in the center-south and by both domestic and British capitalists who controlled nitrate resources in the north.

⁴ My translation. The original in Spanish: “El mecanismo agro-estatal es simple: la hacienda y la familia del propietario concentraban amplios recursos territoriales y, por ende, población que “vivía y moría” al interior del fundo. También controlaban la población minifundista y de pequeños propietarios (pueblos rurales) que dependían de sus favores. El llamado complejo latifundio-minifundio fue un sistema de trabajo (mercado laboral cautivo), un sistema social cerrado y dominado por los hacendados. El sistema electoral hacía el resto: la sobrerrepresentación de las provincias rurales con respecto a los centros urbanos, permitió una presencia fuerte de los terratenientes en el sistema parlamentario”

⁵ Economically liberal, but politically conservative. See Salazar, 2012

⁶ Chile took control of Peruvian and Bolivian territories, leaving the latter without access to the Pacific Ocean. This has had effects until today because the Bolivian government lead by Evo Morales sued the Chilean state in 2013 through The Hague, demanding sovereign access to the Pacific sea.

The war against the Mapuche is particularly relevant because it opened new “public lands” and then new “private estates” in the south. The newly dispossessed Mapuche lands were used to continue reproducing the hacienda system during a substantial portion of the 20th century. Until 1881, the Mapuche people were politically and militarily independent and controlled an area of around 11 million hectares in southern Chile, from the Biobio river south to the Los Lagos region. Between 1881 and 1927, and after a violent war of occupation that killed thousands of indigenous individuals, around 70,000 Mapuche were confined to a 500,000 hectare reserve. These new Mapuche “reducciones” (reservations) which were imposed by force featured land of very poor agricultural quality, and were located mainly in the dry lands of the coastal cordillera between the southern Biobio river and the Araucania region (Bengoa, 1985, 1999, 2012; Klubock, 2014; Torres et al, 2016). The best agricultural lands from the central valley and the areas containing native forests were assigned to new settlers coming from Germany, Switzerland, and other local elites who became landowners. They reproduced the same social structure based on the inquilino’s labor contract in their new haciendas settled on Mapuche lands.

Moreover, the ‘successful’ wars against Perú-Bolivia and the Mapuche served to secure the social power of the landowning factions of the ruling classes, helping them avoid modernization of both agricultural production and the oppressive social relations based on the pre-capitalist labor contract within the haciendas. The landowners, via their oligarchic national power, maintained the hacienda regime, even under the parallel processes of urbanization, industrialization, and working class organization that were beginning to occur during the first two decades of the twentieth century in Chile. The

modern class struggles between capitalists and workers were initiated by both the mining unions that emerged in the north with the nitrate boom after the Pacific War and the incipient copper industry initiated in early twentieth century by Chilean and American capitals. In the south, however, the landowners maintained their privileged social positions because their social power rested mainly on *inquilinos* and seasonal *peones*. However, the miner's unions were a sort of model for working class organization in the nation, and their modes of organization were rapidly transferred to the main urban centers such as Santiago, Valparaiso and Concepcion⁷. In these urban centers, different movements (unions, students, anarchists, artisans, and emerging left parties, among others) were protesting against the miserable conditions which the "bajo pueblo" or popular class and other working class factions were living under during the first two decades of the 20th century. This was known as the "*cuestión social*" (social question) (Bengoa, 1988; Salazar, 1985, 2012; Loveman, 2001).

In this context of increasing social mobilization in urban areas, the landowner's political power began to gradually diminish. A second national Constitution was enacted in 1925 (the first dated to 1833), as a result of more than two decades (1900-1920) of class struggles oriented towards improving the living conditions of the popular and working classes. The 1925 Constitution laid the foundation for the "*populist state*"

⁷ The emerging miner proletariat was at the forefront of the class struggles during the first years of the 20th century. Capitalist power answered miner strikes and struggles with the military force of the state. The most extreme event occurred in December of 1907, when around 3,000 mining workers (*pampinos*) were killed by the army, in what is known as the *Matanza de la Escuela Santa Maria de Iquique* (Iquique's Santa Maria School Massacre). See Devés (1997)

(Salazar, 2009, 2012), the Chilean equivalent of the *welfare state*, especially consolidated during the period of 1938-1973. During this period, also known as *import substitution industrialization*, the landowners were able to maintain their social power in the countryside, but their political power in urban centers declined. This occurred because working and middle classes were gaining power in parliament, state and society through the Radical, Communist, Socialist and other center-left parties, grouped together as the *Frente Popular* (Popular Front) (1936-1941), the *Frente de Acción Popular* (Popular Action Front) (1956-1969), and then replaced by the *Unidad Popular* (1970-1973) (Moulian, 2006). These political parties and alliances represented both popular and growing working/middle classes who were demanding political inclusion and social rights within the nascent Chilean welfare state⁸.

However, this urban movement also created pressure to democratize and “modernize” the “pre-capitalist” social relations in the rural haciendas, which were depicted as oppressive to the peasants. As Bengoa notes, the new political configuration imposed by the 1925 Constitution created “a critical view of the landowners from the point of view of modernity, and therefore, a critique of what was considered to be non-capitalist, feudal remnants in the countryside [...] For most of [the 20th] century, until the agrarian reform, the inquilino was seen as the epitome of rural indignity, material poverty, and moral subjection” (Bengoa, 1988: 19)⁹. Therefore, under the umbrella of the welfare state and

⁸ This was accompanied by rapid urbanization and the construction of urban water networks to provide potable water to urban populations, and also the construction of dams to provide electricity to both urban centers and growing state-led industries (chapter 6)

⁹ My translation. The original in Spanish: “Se conformaba así una visión crítica a los terratenientes desde el punto de vista de la modernidad y, por tanto, crítica de los resabios considerados feudales, no capitalistas,

the over-representation of rural provinces in the parliament, during two-thirds of the 20th century, landowners were able to maintain their social power over different classes of peasants (inquilinos and peones) in the haciendas in the south, a power that in practice was finally destroyed during the agrarian reform process (1964-1973). Simultaneously, the populist state promoted the extension of social rights to popular, working, and middle-classes, as well as the industrialization of the country through different developmental strategies, particularly after the first global economic crisis of 1929 and the creation of CORFO, the governmental Agency for Economic Development in 1938. These actions would ultimately transform both social relations and physical environments. The advent of commercial forestry was one of these developmental strategies undertaken by the populist state in southern Chile after the 1929 crash (Clapp, 1995: 278).

2. Forestry development in southern Chile: from sustainable development to hydrosocial metabolic rifts

The previous section provides the socio-political context into which forestry projects in southern Chile emerged. In this section I frame forestry development in southern Chile as a geographical project, and therefore, as both an ecological and a political-economic project (cf. Harvey, 1996; Smith, 2008; Swyngedouw, 2015). This forestry project has had at least two protracted stages of development: 1) State forestry (1931-1973), which includes the processes of state-led forestry industrialization and agrarian

en el campo [...] Durante casi todo este siglo, hasta la reforma agraria, el inquilino fue visto como la expresión máxima de la indignidad rural, de la pobreza material y el sometimiento moral”

reform (1964-1973); and 2) Neoliberal forestry (from 1974 onwards), which includes the privatization of state forestry assets and counter-agrarian reform. My argument is that although state forestry was justified and depicted as a sustainable development strategy oriented towards improving and recuperating degraded lands and creating dynamic economic activity, the transition to neoliberal forestry is increasingly being identified as an unsustainable development strategy. After four decades of neoliberal forestry (1974-2015), its economic outcomes are very good but its socio-environmental consequences are the opposite.

I frame all these socio-environmental consequences under the notion of *hydrosocial metabolic rifts*. As outlined in the theoretical framework, hydrosocial metabolic rifts refer to the *separation* of local people from their access and control of both land and water (surface and groundwater). The mechanisms by which hydrosocial metabolic rifts have been produced by neoliberal forestry developments are varied. They combine land dispossession, native forest destruction, and the ecological degradation and contamination of land, water and the general environment. In what follows I reconstruct the production of these political, geographical, and socio-ecological processes.

2.1 State forestry project: 1931-1973

State-directed forestry policy began in 1931 and developed gradually during the 1940s and 1950s (Camus, 2006: 167-247). Wide scale planting of pine arose in principle as an adaptive and political response to the problems of soil erosion (Camus, 2006: 169). This was caused by the indiscriminate clearance of native forests and the expansion of the agricultural frontier. This occurred during the last decades of 19th century and early

decades of 20th when the Chilean state, which was controlled by the oligarchic power of landowners, dispossessed the Mapuche from their lands located south of the Biobio river as described previously (Bengoa, 1985, Camus, 2006; Klubock, 2014)¹⁰. In 1889, the Chilean government hired the German forester Federico Albert. He introduced scientific management of forests in order to cope with the new “ecological disorder” (Klubock, 2014: 58-89) produced by the destruction of native forest during the almost fifty years (1881-1927) in which the Chilean state worked to control Mapuche ancestral lands. In this period, “the initial bonanza harvest produced by burning forest during the first years of colonization gave away to drought and widespread soil erosion within a generation” (Klubock, 2014: 18). By 1906, Albert was appointed as the director of the new Water and Forest Department by the Chilean State, which was consolidated in 1911 (Camus, 2006: 158), a nascent institution through which Albert “promoted the extension of state authority over natural resources” (Klubock, 2014: 18). In other words, he pioneered a new scientific approach to forest management, creating a new type of power-knowledge in the arena of land, forests, and other natural resources, which were now declared “public assets” by the state.

During the next decades, Albert’s followers who worked for the state promoted forestation with Monterey pines imported from the USA as the solution to the problems

¹⁰ As I said before, until 1881 the Mapuche controlled a vast territory in southern Chile, from the Biobio river south to the Los Lagos region. In this chapter and dissertation, I don’t focus on Mapuche lands because the Itata river basin (my site in the Biobio region) is located north of the Biobio river (Figure 3.1), an area mainly inhabited by mestizo campesinos—many of them ex *inquilinos*—and independent small farmers. However, Mapuche resistance and ecological conflict with forestry corporations is a relevant socio-environmental struggle occurring in Chile. I will return to this point in chapter 6

of soil erosion and water scarcity produced by the destruction of native forests (Klubock, 2014: 19). These forestry developments were institutionalized in the Forest Law of 1931, which with additional influence by the 1925 Constitution established a state-directed forestry development plan based on the imported Monterey pine (Clapp, 1995b). The main justification for the use of an alien species was to cope with soil degradation and erosion caused by previous processes of deforestation and the extensive production of wheat. For these reasons, Chilean forestry development was, since its introduction, depicted as a sustainable economic activity, both by political elites and landowners (Montalva et al, 2005; Klubock, 2014). Soil degradation was caused by deforestation oriented towards opening new agricultural lands. The advancement of the agricultural frontier also generated new waves of soil degradation due to intense cultivation. The forestry policy goal was to fix the land degradation problem but also to create profitable economic activity by introducing exotic species of pines and eucalyptus (Clapp, 1995). However, the forestry industry began to be profitable only during the decades of the 1950s and the 1960s. This lag was a result of the time it took for pine plantations to mature to an adequate size for harvesting, usually 20 years on average (Clapp, 1995). Thus, by 1960 there were approximately 200,000 hectares of mature pine plantations in southern Chile (Klubock, 2014: 185).

Agrarian Reform stage I, 1964-1970: the reformist government of Eduardo Frei Montalva

Within the forestry development promoted by the populist state and political elites, perhaps the most important takeoff occurred during the presidential period of Eduardo

Frei Montalva (1964-1970). Along with these forestry public investments, a main feature of this historical phase is that agrarian reform was finally introduced as a political project oriented towards benefiting peasants and the rural poor through the redistribution of land and water rights. This transformative and revolutionary process of redistribution of land was not only influenced by the old urban pressures to democratize and modernize the countryside (Loveman, 1976; Bengoa, 1988), but especially by a protracted campesino struggle for land, which finally was going to liberate the campesinos from the semi-feudal labor contract based on their servitude as *inquilinos* within the *haciendas*. Agrarian reform also was influenced by international forces, particularly the US government of John F. Kennedy and his Alliance for the Progress, oriented towards stopping the influence of the Cuban revolution (1959) in Latin America. The Kennedy administration sought to prevent agrarian and other social reforms being appropriated by revolutionary left-wing groups, represented in Chile, for instance, by the *Movimiento de Izquierda Revolucionaria*, MIR, created in 1965, and instead favoring centrist groups based on a liberal theory of development and one which was more open to US influence (cf. Ish-Shalom, 2006; Edwards, 2009).

The Frei government represented this moderate position between the right and the left, which was ideologically based on the social doctrine of the Catholic Church. His party, the Democracia Cristiana (Christian Democratic Party), grew out of the Pope's 1891 encyclical titled 'Rerum novarum', which was adopted by his party. The Frei development program was supported by domestic industrial bourgeoisie and other influential urban capitalist groups because it granted them the best way of definitively modernizing those pre-capitalist structures of the country represented by the hacienda

system while maintaining commercial relations with the US and Europe (Vitale, 1999: 119). Frei's presidential campaign slogan was 'revolution in liberty', and it aimed to develop radical reforms under democratic institutions. This meant respecting the 1925 Constitution which granted an institutional system in which the social demands coming from the rural and urban groups, for example peasants, working unions, and middle-classes, were canalized by the populist state via political parties (Moulian, 2006; Salazar, 2009)

It was in this context, marked by an expanding welfare state oriented to producing citizens with social rights, into which the Agrarian Reform Law was enacted in 1967. This reform was oriented towards redistributing the lands from landowners to the peasants (*inquilinos*) who until then were working under pre-capitalist conditions. In effect, the agrarian reform aimed to bring capitalist modernity to agricultural production, which included destroying the semi-feudal production relations between the *inquilino* and the landowner (Bellisaio, 2006: 189). The 1967 Agrarian Reform Law¹¹ also promoted peasant unions (Bellisario, 2006; Bengoa, 2013; Klubock, 2014), oriented towards organizing the peasants and so better implementing land and water redistribution.

Agrarian reform was a political project in which water was central. In essence, the agrarian reform law of 1967 established that any agricultural property (*haciendas* or

¹¹ Previously, the government of Arturo Alessandri Rodriguez (1958-1964) enacted the first agrarian reform law in 1962. However, this conservative government represented the landowner's power, who obviously opposed any agrarian reform. For this reason, Alessandri Rodriguez did not enforce agrarian reform on a large scale during his mandate, as Frei and Allende did. In effect, Alessandri Rodríguez worked as CEO of CMPC (see below) before and after his presidential mandate (Fazio, 1997: 172)

latifundio) larger than 80 Basic Irrigated Hectares (BIH)¹² was subject to expropriation (Bellisario, 2006: 172; Bengoa, 2013: 470). As I pointed out before, the landowners constructed the main canal networks in Chile during the nineteenth century (Bengoa, 1988), which means that their estates or haciendas consisted of the best quality agricultural lands. Therefore, haciendas located on irrigated lands were the main estates subject to expropriation. In the process, the landowner's social power began to decline. Conversely, peasant power began to grow, which generated increasing peasant revolts directed at accelerating the redistribution of land and water (Petras et al, 1972; Loveman, 1976). After the expropriation, the "land was distributed to the peasants, initially in the form of a 'peasant settlement' (*asentamiento*) for a specific time period, and after that in the form of private property or a cooperative holding. This ambiguous distinction between individual private property and a cooperative or collective unit led to serious controversy between peasants and politicians during the period of reform" (Bengoa, 2013: 470). In other words, the transfer of land from the state to the campesinos was not free, but dependent on the formation of medium and long term organizations known as *asentamientos* (peasant settlements) and *cooperativas* in which the campesinos produced goods collectively in order to generate a surplus value or profit to pay the state for their newly allocated lands (Diario Oficial, 1967).

In relation to the forestry development initiated in 1931, Frei's agrarian reform represented both a rupture and a continuity (Klubock, 2014: 177). The continuity is that

¹² "A Basic Irrigated Hectare (BIH) is an abstract land unit that standardized farmland quality in order to determine its susceptibility to expropriation based on the productive capacity of the land and not just on its sheer size" (Bellisario, 2006: 172).

Frei kept up and expanded the state forestry project. The rupture was that now he expanded the social groups who benefitted from state forestry development. Previously (1931-1964), forestry subsidies and reforestation programs benefitted only the estates or haciendas commanded by the *terratenientes*. This highlights the elitist character of the forestry project in Chile prior to 1964, wherein the state subsidies flowed only to traditional large landowners. As outlined above, they represented the richest people nationwide that also held important political power, and therefore, they influenced state forestry policies.

In other words, the reformist but moderate government of Frei Montalva maintained the interests of traditional landowners, giving them increasing state subsidies to plant pines and eucalyptus on their estates. At the same time, Frei redistributed land to rural workers (*inquilinos*), generating a sort of political inclusion through both their new lands and their gradual involvement in state directed forestry development. Unlike the period 1931-1963, from 1964 onwards the state involved the rural poor in one of its main geographical projects.

This strategy “made [it] possible for small-holders to plant pine on their eroded land and mix stands of pine with pasture, garden crops, and commercial crops such as wheat” (Klubock, 2014: 206). The objective was not that peasants only plant pines and eucalyptus on their new plots obtained through the agrarian reform, but that they combine their traditional crops with trees oriented to supplying raw materials to the expanding state forestry project.

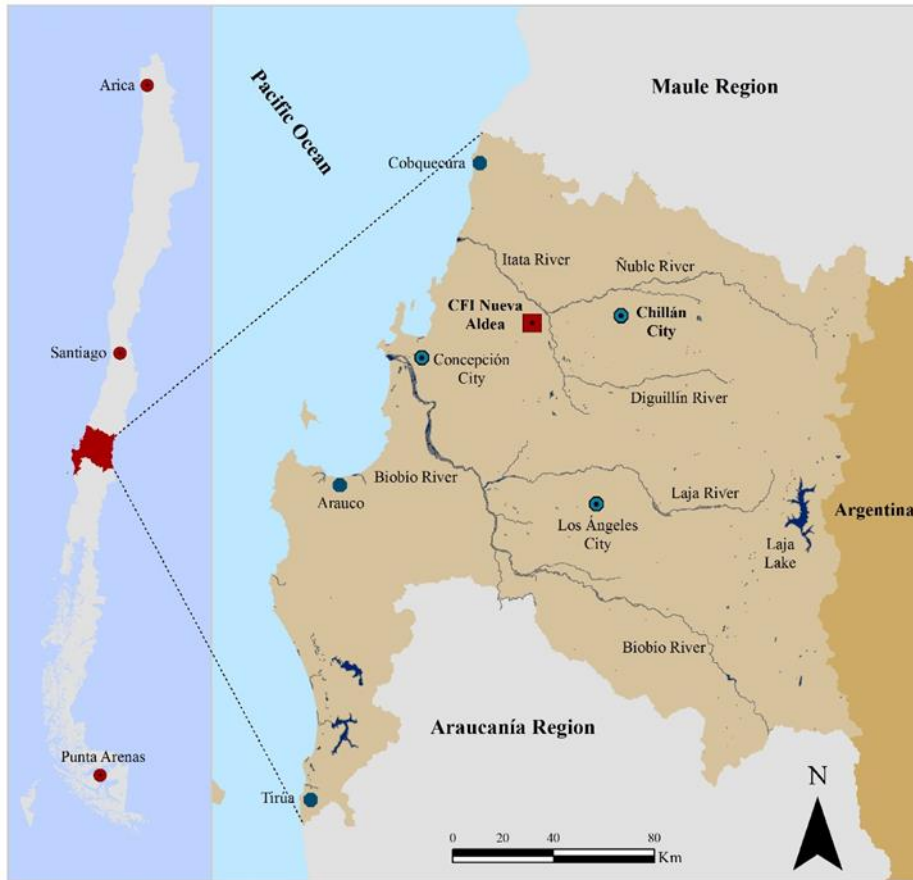
In this respect, Frei’s agrarian reform also represented a key rupture with the previous stage by promoting the industrialization of the forestry project through the construction of

cellulose plants in southern Chile. At that time there was only one cellulose plant in Laja (Biobio Region), whose main product was paper pulp. It was inaugurated in 1958 and controlled by the *Compañía Manufacturera de Papeles y Cartones* (CMPC), the property of a traditional elite capitalist family in Chile (Matte group) (Fazio, 1997: 179) whose production was oriented towards the domestic market. The Frei plan was “to build a number of cellulose plants that would absorb the production of existing pine plantations and stimulate reforestation throughout the south. [Also, it sought] to produce new industries and exports that could diversify an economy almost entirely dependent on copper revenues. Forestry and land officials frequently described pine and cellulose as Chile’s new copper” (Klubock, 2014: 197).

Through CORFO, the Chilean state and another 44,000 private shareholders had previously created *Industrias Forestales S.A* (INFORSA) in 1956 (Clapp, 1995: 279), all of whose stocks were finally purchased by CORFO in 1964 (Klubock, 2014: 198). Then, through CORFO and INFORSA, two main cellulose plants were constructed under the Frei government: *Celulosa Arauco* (1967), which is located in the Arauco Province of the Biobio Region, and *Celulosa Constitución*, which is located in the coastal area of the Maule Region (Clapp, 1995; 280; Klubock, 2014: 198) north of Cobquecura city (Figure 3.1). Like Laja, the main product of these mills is paper pulp. Other important forestry sub-sectors are silviculture and extraction, lumber, paper, and furniture (Clapp, 1995: 289; Fazio, 1997: 174). Silviculture and extraction’s main products are raw materials (trees) used by the other subsectors. The lumber subsector’s main products are pine boards and beams, laminated beams, softwood, and wood chips. The paper subsector, which is directly linked with the pulp subsector, includes paper, tissue (paper towels,

toilet paper, etc.), and other products such as paper for newspapers and printing (Fazio, 1997: 177). Finally, the furniture sub-sector “depends on adding value to raw lumber” (Clapp, 1995: 289). However, unlike all these subsectors, the cellulose subsector needs large amounts of capital investment in the industrial plants, which partially explains the “state activism” of Frei during the 1960s, which constructed the main pulp mills that were going to be essential to forestry development during the 1980s and 1990s (Clapp, 1995: 292).

Figure 3.1: Biobio Region according to its main river basins and cities



Source: Center for Environmental Sciences EULA-Chile, University of Concepcion, Chile

In addition, the interrelated processes of forestry industrialization and agrarian reform created new state institutions, mandated to implement and manage the new socio-ecological order. The following agencies were created: CORA (*Corporación de Reforma Agraria*), the state agency for agrarian reform (Bellisario, 2007a: 6); the SAG (*Servicio Agrícola y Ganadero*); INDAP (*Instituto de Desarrollo Agropecuario*); INIA (*Instituto de Investigaciones Agropecuarias*) and ODEPA (*Oficina de Planificación Agrícola*). They were all oriented to promoting research, planning, development, and “the technical modernization of agriculture” (Bellisario, 2007b: 177). CONAF (*Corporación Nacional Forestal*) was created in 1970 as a private, non-profit organization working under the umbrella of the state to supply technical support to forestry plantations and to manage public lands and protected areas. In 1969 INFOR (*Instituto Forestal*) was also created with the goal of promoting forestry research and development.

Agrarian reform also expropriated and redistributed water traditionally used by landowners to irrigate their agricultural lands. Between 1964 and 1973, 729,454 hectares of irrigated land were expropriated by CORA, which represented 58.7% out of the total of 1,243,628 hectares of irrigated land in Chile (Bellisario, 2007a: 15). In order to redistribute this irrigation water, the 1967 Agrarian Reform Law also included a new Water Code (enforced in 1969) that “was accompanied by a constitutional amendment which declared all water rights to be public property” (Bauer, 1997: 642). This was because, until then, surface water (lakes, rivers) within the hacienda and especially the irrigation canals constructed in the 19th century were considered the private property of landowners (water was attached to land), which was backed up by the first Civil Code of 1855 (Bengoa, 1988; Bauer, 2004: 39). The 1969 Water Code also created the DGA

(*Dirección Nacional de Aguas*), the state water agency. Finally, the “*Empresa Nacional Riego*” (National Irrigation Company) also was created, oriented towards improving and extending the network of irrigation canals in the nation. In 1975 it was transformed into the CNR or “*Comisión Nacional de Riego*” (National Irrigation Commission)¹³.

The new configuration created by the expanding Chilean welfare state was going to influence all future forestry development. In fact, the combination of social and agrarian reforms, substantial state-funded investments in the whole forestry project (reforestation programs, cellulose plants) and the building of new state institutions to manage this new socio-nature, finally produced a dynamic state forestry industry in the 1960s, one that was going to be the basic industrial structure for forestry development during the following decades (Clapp, 1995).

Agrarian Reform stage II, 1970-1973: the socialist government of Salvador Allende, *Unidad Popular* (UP)

The Allende government continued the policies of agrarian reform and reforestation with pine and eucalyptus as a means of coping with soil erosion, while simultaneously meeting peasants’ demands for land and water. But unlike Frei, Allende undertook the expropriation of forestry estates and redistributed them among peasants who still had no land. Frei did not expropriate forestry estates, only agricultural estates. However, “sustainable forestry continued to be defined in terms of replacing native forests with

¹³ I will return to this theme of water institutions chapters 4 and 5 because they play a key role in land-water management until today, and they are also being questioned in the context of current water reforms undertaken by the second government of Michelle Bachelet (2014-2018)

Monterey pine plantations” (Klubock, 2014: 209). This tendency of replacing native forest with plantations was rapidly identified by the new officials from the Allende government, principally due to increasingly frequent campesino (and Mapuche) protests against the destruction of native forests by commercial forestry estates. On both Mapuche and non-Mapuche lands, the Allende administration attempted to undertake a more sustainable agrarian reform and forestry development through the expropriation of forestry estates which still had extensive native forests. However, the Allende government “faced certain obstacles to expropriating forestry fundos” because their “landowners were protected by Frei’s Agrarian Reform Law [1967], and the UP was committed, at least officially, to pursuing a legal path to a socialist economy. The government confronted the problem of how to indemnify landowners for their forests” (Klubock, 2014: 211). Moreover, the growing campesino uprisings pressed the Allende government to accelerate the process of land-water expropriation (Petras et al, 1972; Loveman, 1976). Campesinos invaded and took control of some these forestry estates because they “understood that their survival was inextricably bound to the survival of the [native] forests” (Klubock, 2014: 213). Therefore, Allende tried to find a legal means which respected the 1925 Constitution to expropriate these estates which were destroying native forests. Allende nationalized 3 million hectares of land covered with native forest (Clapp, 1995: 280), and expropriated a large estate of 270,000 hectares in Panguipulli (Araucania region) which created a “state-run forestry complex, the Complejo Maderero Panguipulli” (Klubock, 2014: 214). These actions seemed to be a step forward to protecting native forests. However, at the same time, the replacement of native forests by forestry plantations “remained the cornerstone of the UP’s forestry policy” (Ibíd, p. 216).

Nonetheless, this was done in parallel with the up-scaling process of land redistribution to the rural poor, balancing “campesinos demands for land with forestry development” (Klubock, 2014, p. 238). In effect, the socialist government of Allende radicalized the process of agrarian reform and land expropriation initiated by the reformist government of Frei. The historical statistics of land expropriation confirm this fact. From 1964 to 1973, a total of 9,965,868 hectares of land were expropriated¹⁴. Of this land, 35.8% (3,564,243 hectares) was expropriated by Frei (1964-1970), and 64.2% (6,401,625 hectares) was expropriated by Allende (1970-1973) (Bellisario, 2007a: 15). As Allende’s term lasted half as long as Frei’s (three and six years, respectively), these numbers express the different speed in the application of the politics of expropriation undertaken by agrarian reform. Indeed, these processes also express the ideological and political options (socialism and revolution of Allende vs. the liberal reforms of Frei) underlying the agrarian reform process. They also show the pressure exerted by the peasant protests on the Allende government to accelerate the agrarian reform on larger scales, even affecting the forestry states.

In sum, the brief socialist forestry experiment intended to reduce social inequalities and meet land-water demands of agrarian reform, but ended with Pinochet’s seizure of power in 1973. The short-lived socialist forestry project would soon become neoliberal forestry, and many land and water rights gained by peasants during these revolutionary

¹⁴ In turn, this total is divided into three categories of land: 1) Irrigated land: 729,459 hectares; 2) Arable dry land: 1,500,888 hectares; and 3) Non-Arable dry land: 7,735,522 hectares. Bellisario, 2007a, p. 15, Table 2.

years of social struggle against the old regime of haciendas and landowners were going to be dispossessed by new state policies inspired by neoliberal ideology.

2.2 Neoliberal forestry project: 1974-2015.

Counter Agrarian Reform I, 1974-1990: ‘dictatorial dispossession’ of the Pinochet regime

With Pinochet’s coup d’état on September 11, 1973, the second stage of forestry development began in southern Chile. This phase reversed the “social forestry” policies implemented jointly with agrarian reform by Frei and Allende, reorienting them toward privatization, global markets, and corporate profits. Since then, “industrial forestry no longer worked to the benefit of the rural poor. Instead, the fruits of an industry built with significant state input since the 1930s were directed into the hands of a small group of financial conglomerates, which took over the forested land and expelled campesinos from estates throughout southern Chile” (Klubock, 2014: 238)¹⁵. In effect, from 1974 onwards, the forestry project was re-oriented as a regime of private accumulation secured by state subsidies. The neoliberal forestry project began to scale up geographically to satisfy the profit needs of large corporations (Torres et al, 2015). During this stage, under new policies of accumulation by dispossession and neoliberalization of nature implemented by Pinochet and the Chicago Boys, the cellulose plants constructed by Frei in Arauco and Constitucion were privatized. These industrial sites were transferred to the Cruzat-Larraín group in 1977, then re-transferred to the state in 1983 due the global and national

¹⁵ These processes of land dispossession also occurred in Santiago region (Chapters 5 and 6).

economic crisis, and then dispossessed again as a public asset, being reprivatized and given to the Angelini group in 1984, who own them until today under the name of Forestal Arauco (Clapp, 1995: 281-288; Fazio, 1997; Klubock, 2014: 242, 244, 270; Torres et al, 2015). INFORSA also was privatized and transferred “well under the market value” (Klubock, 2014: 242) to the Vial group in 1979 which began to construct a cellulose plant in Nacimiento, Biobio (Fazio, 1997: 180). Like Cruzat-Larraín and other elite economic groups, their collapse due to the economic crisis of 1982 obligated Pinochet to re-nationalize and then reprivatize all these public forestry assets (Capp, 1995; Fazio, 1997)¹⁶. The Angelini group not only took control of the cellulose mills in Arauco and Constitucion, but also of vast tracts of land containing forestry plantations. The Matte group, through CMPC, took control of Forestal Mininco in 1979 and INFORSA in 1984, the latter including the pulp plant in Nacimiento started by the Vial group (Fazio, 1997: 174, 181-182). In other words, the privatization of these companies included the transfer of important industrial assets such as factories, cellulose plants, sawmills, and lands with both native forests and plantations of pine and eucalyptus (Klubock, 2014: 243). Since then, the Angelini and Matte groups (Forestal Arauco and CMPC) are the main players controlling, driving, and profiting from this reconfigured neoliberal forestry project.

These processes of privatization in Chile created a new neoliberal configuration in which the state is not a forestry producer anymore, but now it only creates tax exemptions and subsidizes private forestry corporations. This was legally facilitated by one of the

¹⁶ The Chilean historian Gabriel Salazar has called this brief period the “*interludio proteccionista*” (protectionist interlude) in the middle of the neoliberalization process (Salazar et al, 2002: 59)

first neoliberal re-regulations undertaken by the Pinochet regime: Decree Law 701 which was enacted in 1974 replacing the 1931 Forest Law (Camus, 2006; Klubock, 2014). The new Decree Law 701 showed strong ideological continuity by reproducing the soil degradation argument given at the beginning of the 20th century to justify reforestation with pine and eucalyptus. But now forestry revenues would flow to global corporations instead of the state. Therefore, I suggest that the state elites under the dictatorship (and then under democracy) in alliance with forestry corporate elites are the main players driving forestry and its attendant socio-environmental transformations in southern Chile. Thus, they are the main social actors responsible for forestry derived hydrosocial metabolic rifts in the region.

The best example of the alliances between the military dictatorship and the forestry corporations is a key individual in the privatization process of public companies during the Pinochet dictatorship: Julio Ponce Lerou (Monckeberg, 2001; Fazio, 1997). During the government of Allende, Ponce Lerou worked for CMPC in Concepcion (CIPER-Chile, 2015). He was already married to one of Pinochet's daughters, Veronica Pinochet. In 1974, Pinochet appointed Ponce Lerou as the director of CONAF, the state agency in charge of implementing DL 701. He was placed in charge of implementing the subsidy created by DL 701 by which the state covered 75% of the total cost to reforest with pine and eucalyptus plantations. Ponce Lerou worked as CONAF's director between 1974 and 1979, at which point he became the director of CORFO until April of 1983 (Monckeberg, 2001: 44). From these powerful positions, which included the direction of public companies such as Celulosa Arauco, Celulosa Constitución and INFORSA, Ponce Lerou actively participated in the process of privatizing these public forestry assets that finally

ended up in the hands of the Angelini and Matte groups in 1984. Ponce Lerou also enriched himself by appropriating important public forestry assets, such as lands allocated to campesinos during the agrarian reform but repossessed by Pinochet, and the Panguipulli forestry complex in Araucania, which had been nationalized by Allende during the agrarian reform (Klubock, 2014; Carvajal, 2015)

Although Ponce Lerou was involved in implementing DL 701, its creator was Fernando Léniz Cerda, the Minister of Economy during Pinochet's regime between 1973 and 1975. During the 1960s and under the Frei government, Cerda also worked for CMPC and was president of CORMA¹⁷, a position from which he planned the creation of Decree Law 701 (Carvajal, 2015). This was modified in 1998, which allowed state subsidies to remain until 2010. In 2011, under the government of Sebastián Piñera, the Decree Law was extended for two years (2012-2013). In 2014 and under the Bachelet government, a new discussion began about extending it for 2 more years (2016-2018)¹⁸. Nevertheless, now there is a growing group of scientific communities, Mapuche activists, parliamentarians, environmentalist organizations, and public officials who disagree with this transfer of public resources to large forestry corporations. Among the main arguments are precisely the negative hydrosocial consequences related to forestry

¹⁷ CORMA: *Corporación Chilena de la Madera* [Chilean Wood Corporation] is a Chilean forestry entrepreneurs association created in 1952. In 2015, it “brings together around 170 stakeholders from the forestry sector, covering over 55% of Chile's planted hectares and 85% of forest exports”. Source: <http://www.corma.cl/about-us>

¹⁸ While I was writing this chapter, in November 2015 the Senate approved an extension of the DL 701 for one more year (2016)

plantations in southern Chile (Navarro, 2014; Correa, 2015; Gonzalez, 2015; Universidad Austral de Chile, 2015)

During these four decades of neoliberal forestry (1974-2015), the reforestation programs have been much more intense than in the previous state forestry development. High corporate profits have been subsidized by the state. For instance, Klubock indicates that “between 1969 and 1978, when CONAF ended the program of convenios [agreements] with small-holders, campesinos reforested 200,000 hectares throughout southern Chile” (Klubock, 2014: 201). However, it is estimated that by 1974 Chile had 480,000 hectares of pine and eucalyptus, which by 1994 reached 2,100,000.00 hectares (Aguayo et al., 2009: 371). This means an annual growth rate of 81,000 new hectares of pine and eucalyptus during these periods. This rapid geographical expansion of the forestry plantations was undertaken mainly by the corporations that dispossessed the state-owned forestry fundos and forestry industrial complexes created by Frei and Allende.

This happened in the context of the Pinochet counter-agrarian reform, in which many peasants were dispossessed of the lands that they received under agrarian reform, which were typically returned to former landowners. In effect, out of a total of 9,965,869 hectares of land expropriated by Frei and Allende (1964-1973), 33.1% (3,182,225 hectares) was returned to former landowners between 1973 and 1980¹⁹. However, peasants were able to retain 41.1% (3,946,106 hectares)²⁰, mainly through individual

¹⁹ From these, 258,990 hectares were irrigated lands

²⁰ From these, 508,073 hectares were irrigated lands

plots or *parcelas*. Another 16.2% (1,560,452 hectares) were auctioned, while 9% (869,221 hectares) were transferred to public institutions such as the armed forces (327,932 hectares), CONAF (364,347 hectares) and CORFO (107,915 hectares). The remaining 0,5% (50,000 hectares) were not assigned until December 1989 (Bellisario, 2007a: 19).

Counter-agrarian reform was a large scale process of land dispossession. Pinochet was selective with the dispossession of campesinos. The peasant groups that were able to maintain their lands often were obligated to politically support the dictatorial regime. The other peasants dispossessed from their previously gained lands were often prosecuted, tortured, and many of them were killed. Campesinos were one of the main victims of the Pinochet dictatorship because many of them actively supported the Allende's socialist project by taking control of lands and expanding the geographical scale of the agrarian reform during their revolutionary struggles against the landowners and the hacienda system during the Frei and Allende governments (Petras et al, 1974; Loveman, 1976).

In this new neoliberal forestry configuration—characterized by the privatization of public forestry assets, implementation of DL 701, and the counter-agrarian reform—Pinochet also kept the previous forestry project intact but now under a subsidiary state and corporate power represented mainly by Forestal Arauco and CMPC. This corporate power was enhanced after democracy was recuperated in 1990. For instance, from 1997 to 2011, it is estimated that forestry plantations in Chile increased by 753,000 hectares, with an annual increase of 37,000 hectares. Today, the official statistics show that the total area covered by forestry plantations is 2,447,591 hectares nationwide (INFOR, 2015: 24). It is calculated that half of this is directly due to the state subsidies based on

DL 701, with the majority of those subsidies being granted to Forestal Arauco and CMPC.

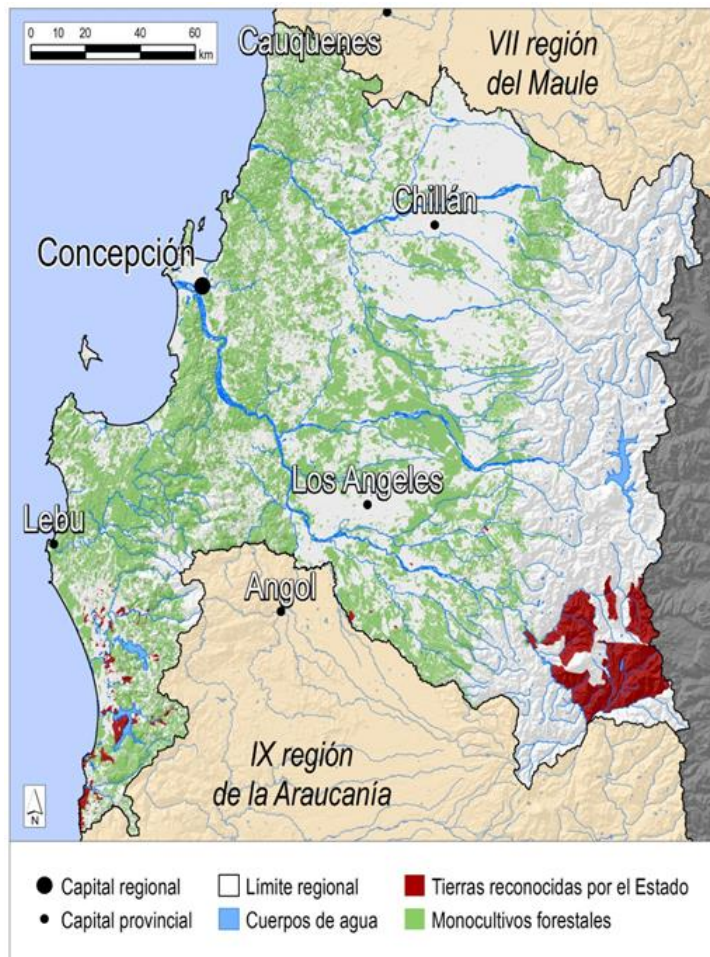
Since 1990, the democratic governments returned to the policies of subsidizing peasants and small-holders, a policy which was previously terminated by Ponce Lerou in 1978, as a means to reforest their lands with pine and eucalyptus. However, their participation in the total amount of subsidies is smaller than for medium-large corporations. For instance, from 1974 until 2013, the Chilean state apportioned a total of \$870 million to forestry subsidies. 70% of this amount was assigned to corporations such as Forestal Arauco and CMPC and only 30% to the peasants and small-holders (Fazio, 1997; González, 2015; Carvajal, 2015).

In this historical-geographical context of expansion of forestry plantations under corporate control, 37.7% of all national forestry plantations are located in the Biobio region, which up until 2013 contained a total of 923,506 hectares of plantations (INFOR, 2015: 24) (see Figure 3.2, green area). This makes Biobio the main forestry territory in the country. The Itata river basin has become one of the areas most affected by this *pine fever* (Klubock, 2014: 169). The unprecedented geographical expansion of this forestry project coincides with the advancement of different types of environmental degradation and hydrosocial metabolic rifts associated with forestry development. By 2014, after forty years of intense use of water resources in the Biobio region by the forestry plantations, almost 60,000 rural inhabitants in the area have been left without water

(Torres et al, 2015: 120)²¹. As a consequence, peasants and the rural population are being separated from their direct access and control over water resources, the result being that they are left without water for their livelihoods. These new marginalized, waterless social groups are being serviced by water trucks financed by regional and local governments. In the following, I analyze the hydrosocial metabolic rifts produced by the neoliberal forestry project (1974-2014), illustrating the Itata river basin case. I will focus on how forestry development has been producing these patterns of uneven socio-spatial development, in which an increasing amount of the rural population is being left without water. I will continue relying on historical accounts, but I will illustrate the process using my ethnographic data collected for this research in 2014.

²¹ In the Santiago region, pork industry, mining, and urbanization projects have also contaminated and overexploited aquifers, leaving thousands of local peasants and small-farmers without water, which currently stands around 26,000 people in November 2014 (Chapters 5 and 6)

Figure 3.2: Forestry plantations in the Biobio Region



Source: Center for Environmental Sciences EULA-Chile, University of Concepcion

3. Ethnographies of dispossession and new hydrosocial metabolic rifts in the Itata river basin

According to my interviews conducted in Biobio, there are at least four main interrelated hydrosocial metabolic rifts associated with forestry development in the Itata river basin, namely: 1) land dispossession, 2) native forest dispossession, 3) water dispossession associated with forestry plantations (silviculture/extraction sub-sector), and 4) water dispossession associated with forestry industries (cellulose pulp sub-sector). In

what follows, I discuss each one of these themes, while illustrating these hydrosocial metabolic rifts through the biographical experiences of campesinos and small-farmers.

3.1 Land dispossession

Land dispossession, as practiced by large and medium forestry corporations on the agricultural lands of local peasants and small-holders, is one of the key elements that explains the economic success of neoliberal forestry development (Klubock, 2014; Torres et al, 2015). The mechanisms for dispossessing local farmers from their lands are varied. During the agrarian reform, many peasants who received land did not receive land titles because they were accustomed to working under the *asentamientos* and *cooperativas* systems. When Pinochet took power in 1973, many peasants were in the early stages of their “asentamientos”, or common lands. On those lands they collectively produced their subsistence in the new geometry of land plots which were the result of agrarian reform. The new rural villages or “asentamientos” were inhabited by the new peasants with land, and commonly they were relocated on an old estate, hacienda or fundo. These asentamientos were composed of certain numbers of peasant families, certain areas of land, and certain quantities of water shares (when it was irrigated land). These asentamientos were managed by peasant communities.

However, the Pinochet dictatorship and its neoliberalization process was oriented in the opposite direction of these collective projects, in that it favored individual property rights. These were promoted by both the new technocratic civilian groups (Chicago Boys), but also by the old landowners who lands had been expropriated by Frei and Allende during the period of agrarian reform. Many of them argued that Allende violated

Frei's agrarian reform by expropriating forestry estates such as Panguipulli. As mentioned before, many of these collective lands which were organized as *asentamientos* were dispossessed and returned to their old landowners, others were auctioned, while still others were transferred to public institutions (Bellisario, 2007a). There was a process of privatization of the collective lands granted during the agrarian reform to the peasants. Many forestry companies bought these lands, but also appropriated others through extra-economic means (Glassman, 2006). In essence, under the new wave of land dispossession, which combined with the "intense violence" of the Pinochet dictatorship, the new large forestry companies such as Forestal Arauco and CMPC "began to expel *inquilinos* from their private estates [that] they purchased and to buy land from *campesinos* at very low prices, establishing a monopoly over forests. They then earned credits and subsidies from the state by planting pine, which in turn drove up the price of land. The control of land in forestry zones also ensured a cheap source of labor for the forestry companies, since former estate workers and smallholders, deprived from access to agricultural land, turned to wage labor in logging camps and sawmills" (Klubock, 2014: 242-243).

Julio²², a peasant from the Ninhue commune in the Itata river basin, experienced and was a witness to all these processes. During our interview in his humble rural house, located next to a forestry plantation and living without water since 2011, he recalled that an "*asentamiento*" was created during the government of Allende into the Fundo Lircay. Living with his parents and 10 siblings, he was 16 years old when the 800 hectare Fundo

²² To guarantee the confidentiality of the interviewees, all the names used in this dissertation report are pseudonyms.

Lircay was expropriated by Allende in 1971 from its landowner, a man called 'Cox'. The lands were redistributed among poor peasants, including Julio's family. Julio remembers that before agrarian reform the patron often requested that he perform agricultural activities on the fundo for free, as part of the *inquilino* labor contract between his father and the patron. Julio also remembers that during the stage of the "asentamiento Lircay" (1971-1978) around 100 persons or 10 families lived there and collectively worked the crops and managed other agricultural and livestock production. By 1979, Julio remembers that CORA auctioned off asentamiento Lircay. The fundo was sold to a private individual, "a man called René", who transformed the land to produce grapes and wine during one decade (1979-1989). "Mostly we stayed there with Mr. René and as he had vineyards and needed people like us working for him. He was there around 10 years and then he sold the estate to a forestry company, I think that was 1988 (...) [Then] we were working with the forestry company for two years. [Rene did sell 700 hectares or so because] he had to return like 100 or 120 hectares to the previous owners"²³. This meant that René had to return at least 100 out of the 800 hectares to Mister Cox, the former landowner of Fundo Lircay before it was expropriated by Allende.

This is an example of the general trend of land dispossession as it occurred during the Pinochet dictatorship, which largely explains the geographical expansion of forestry plantations during the period of 1979-1990. This was the process of land dispossession as experienced by peasants that had received land under agrarian reform. The process also

²³ Julio, interview conducted in the commune of Ninhue, Biobio region, October 1 of 2014

meant a fundamental reconfiguration in landholding, one in which the traditional landowning class and the hacienda system were gradually and definitively displaced by the new forestry corporations oriented towards global markets, and which concentrated on using the land for forestry plantations. “In essence, the dictatorship’s combination of intense violence and radical free-market policies allowed the big players in the forestry industry to put together vast economic empires of plantations, native forests, sawmills, and pulp factories, setting aside more traditional landowners” (Klubock, 2014: 243). That is to say, the landowners’ social power emerged during the Spanish colonial era, consolidated during the 19th century and maintained until the agrarian reform, begins its end. This finally meant the “capitalist modernization” of agriculture via the emergence of a new agribusiness class oriented towards exportation and global markets (Bellisario, 2007a, 2007b) (chapter 5).

Like Julio, many peasant families living in asentamientos created under the agrarian reform were dispossessed of their land by the dictatorship because they did not attempt to get the individual land titles before the land was auctioned. Some campesinos did, but many did not. Those who maintained their lands often did it in exchange for politically supporting Pinochet. However, many campesinos were expelled from the estates, and these estates were subjected to accelerated land use changes, shifting from traditional crops such as wheat to the new ‘Chilean copper’, forestry plantations. In other words, the agricultural lands from the asentamiento were transformed into forestry monocultures of pine and eucalyptus. The incentives of Decree Law 701, which subsidized up to 75% of the total cost of reforestation, were among the main drivers in this stage of dictatorial land dispossession in southern Chile. The consequences for poor campesinos were that

they were expelled from their lands, their unique means of subsistence displaced after decades of struggles against the hacienda system. Also, for many campesinos, this process meant their expulsion from rural to urban areas in search of wage labor to survive. Julio said that all nine of his siblings immigrated to cities like Chillan, Concepcion or Santiago to look for jobs because the forestry plantations did not need them as permanent workers. “Without their lands, these producers have few options: immigrate to urban centers, survive with the small slice of land that they frequently maintain, or work for the forestry corporations. Frequently, they combine these options” (Torres et al, 2015: 114). This is the case of Julio, who today lives on a small plot of land as a *mediero* (land renter who pays to the landowner with labor and sharecrops) in which he has subsistence crops, produces coal with a native tree called *espino*, and also works sporadically for the forestry plantations through *subcontratistas* [subcontractors or intermediaries between the worker and the large forestry company] in the area of the Ninhue commune. “Here the forestry companies took all the lands. [The] best [lands] were all sold to the forestry corporations. For instance this plot produce much less wheat that in the past. Here we live only thanks to the *patron*. He gives me coal fifty-fifty [*mediero*], and all the rough logs after cutting the tree, but this year he no longer does. The other thing is that he gets me odd jobs around like herding animals and with that I can get some income to maintain myself and my family”²⁴. Julio’s life story is illustrative of these processes of counter-agrarian reform and land dispossessions driven by forestry development during the Pinochet dictatorship.

²⁴ Julio, interview conducted in the commune of Ninhue, Biobio region, October 1 of 2014

Julio is also an example of this new wave of water dispossession driven by the pine and eucalyptus plantations because since 2010 he has not had water in his home. When I asked him why he does not have water anymore, he told me: “*¡por las forestales!*” (Because of the forestry plantations!). This is the main explanation given by local peasants when they are asked about the causes of the lack of water in the area. The idea expressed by Sol that “*la sequía es la forestal*” (forestry is the drought) is gradually being inscribed as a new knowledge, a new discursive formation that is creating and re-creating new social imaginaries and resistances against forestry corporations in Biobio and southern Chile.

Scientific knowledge concurs with these people’s experiential knowledge. According to biophysical studies, after forestry plantations grow for several years (ranging from 10 to 25 years), stream flows in the river basins and aquifers begin to decrease. This is affected by factors such as evapo-transpiration rates, canopy interception loss, and the infiltration capacity of runoff to reach and recharge aquifers, all of which affects the water balance in the basin (Huber et al, 2008, 2010). Following the traditional model of the hydrological cycle (cf. Linton, 2010), these biophysical studies consider that the amounts of water consumed by forestry plantations are associated with variables such as forest cover (e.g. shrub, grassland, native forest, forestry plantation), climatic conditions (precipitation), and soil water retention capacity (runoff, infiltration, percolation) (Huber et al, 2008). In Chile, “the effect of forestry plantations on water resources is mainly due to the high canopy interception loss and soil water retention capacity of the soils”, which means that forestry plantations produce lower water balances in areas of sandy soils and lower rainfall (Huber et al, 2008: 147). These characteristics are present in the Biobio

region and Itata river basin, whose territories contain vast areas of forestry plantations (Figure 3.2). In the coastal Cordillera, these plantations were settled there to supposedly fix the problems of soil erosion and land degradation caused by intensive native forest exploitation in the past (Huber et al, 2010: 220).

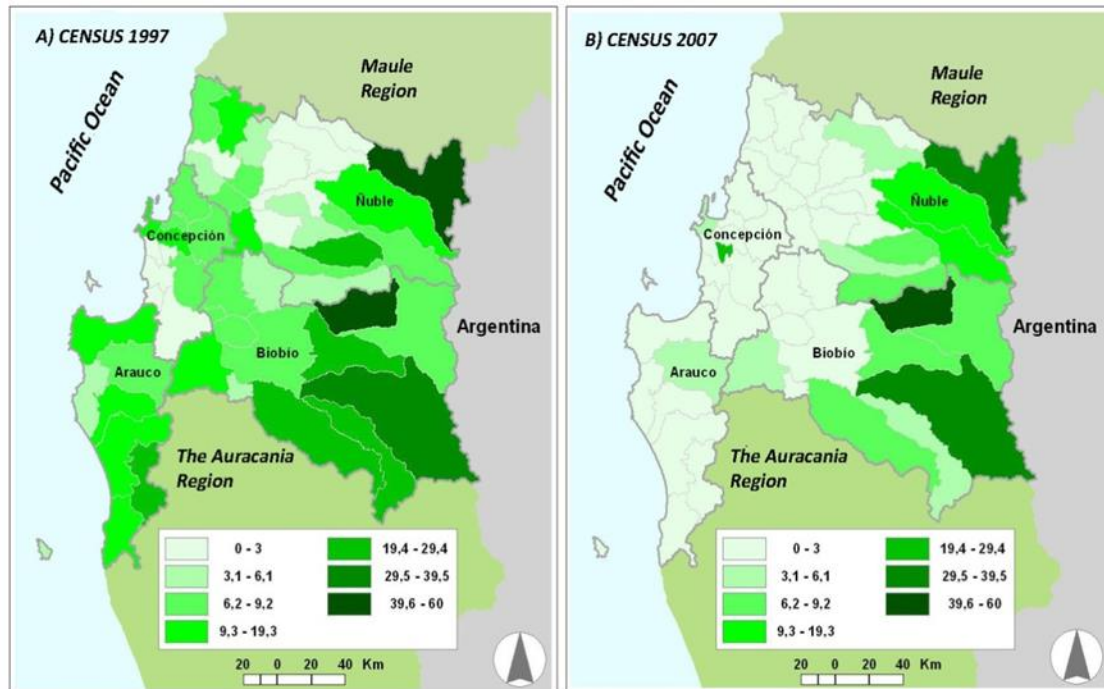
3.2 Native forest dispossession

This means that many of the agricultural lands that were transformed into forestry plantations were previously areas covered by native forests. If the rural poor were dispossessed of their lands under the Pinochet regime, these lands were also dispossessed of their native forests due to neoliberal forestry. This was especially intense in the Biobio region as it is the core area of forestry development nationwide. As noted by Klubock, “between 1978 and 1987 in the Biobio region, 31 percent of the native forests in the coastal cordillera were burned and replaced with plantations” (Klubock, 2014: 257). This process continued during the 1990s and 2000s. Figure 3.3 illustrates the regional scale of destruction of native forest in the coastal cordillera. It can be noted that the area of the Itata river basin, particularly downstream, was almost completely cleared between 1997 and 2007. According to public officials of the PRODESAL Program from INDAP interviewed in 2014, this replacement of native forests by pine and eucalyptus has reached around 30% and 70% of the total municipal surface in communes such as Cobquecura, Coelemu, Ránquil, Trehuaco, Quirihue, Ninhue, and Portezuelo. All these communes are located downstream from Nueva Aldea, a new forestry industrial project funded by Forestal Arauco that includes a cellulose plant which has been operating in the area since 2006 (Torres et al, 2015) (Figure 3.1)

For instance, in the town of Cobquecura, a municipal public official recounted to me in an interview that the “Fundo Pan de Azúcar”, a tract of land which had almost 300 hectares of roble’s (oak) native forest, existed in this area. This fundo was sold out to a “forestry company that cleared all this native forest, all of it! 300 hectares of oak! I do not know, maybe 20 meters high each tree. In fact, if you go there I think there still are oaks under the pines”²⁵. During the interview, Alberto contrasted this large-scale destruction of native forest by forestry corporations with the way in which traditional small-farmers and peasants use the native forests. According to him, when the forestry corporation cuts the native forests on a large scale, commonly there is no penalty from CONAF. However, when one peasant cuts one or two native trees for wood and other domestic uses, they are fined by CONAF, because cutting native trees is banned without official permissions. Alberto explained that this situation also put pressure on peasants to abandon agricultural (unprofitable) activities and sell their lands to the forestry companies.

²⁵ Alberto, Public Official, Municipality of Cobquecura, Biobio, interview conducted in September 15, 2014

Figure 3.3: Changes in native forest cover in Biobío according to municipality (%), 1997-2007



Source: Torres et al, 2015, p. 116

According to other peasants who were interviewed, these corporations practically harass the campesinos, trying to convince them to sell their lands. Forestry corporations, such as Forestal Arauco, need these lands to reforest with pines and eucalyptuses, which in turn will feed new cellulose plant projects such as Nueva Aldea. In this context, the small farmers “are rounded up and are practically obligated to sell their lands”²⁶. As the subsidies from the state continue to grow, corporations such as CMPC and Forestal Arauco need to expand their land assets (Fazio, 1997). Destroying native forest and

²⁶ *Ibídem*

dispossessing peasants from their lands are the main strategies to access and control these coveted lands.

Figure 3.3 shows how the native forest of the coastal cordillera area of the Itata river basin was cleared to be replanted with forestry plantations. This area is actually extensively reforested with pine and eucalyptus. The destruction of native forest and the ecological changes that occur after the land is covered with exotic species are producing water scarcity and peasant dispossession in the area because “the extensive plantations cause the desiccation of topsoil and diminish the amount of water in the valleys at the feet of planted hillsides, leading to the deterioration of the conditions of agricultural production in which peasants depend for subsistence” (Klubock, 2014: 257). In this context, peasants are also selling their lands because not only are they are pressured by forestry plantations, they increasingly lack water for agricultural production and domestic uses in the home.

3.3 Water dispossession: non-human nature and forestry plantations

These processes of water scarcity are not uniquely associated with forestry plantations, but also with the non-human nature of Earth’s geological processes. A typical discourse collected during my ethnographic interviews was that the 8.8 magnitude earthquake that occurred on February 27 of 2010 (27/F) in central Chile worsened the already critical situation of water scarcity in the area. Until 27/F, water scarcity was principally attributed to the forestry plantations and the drought. The discourse that the 27/F earthquake worsened the water scarcity affecting the area is inscribed in the

experiential knowledge of peasants and rural populations, but it is treated with skepticism by public officials, who frequently do not live in the area. According to this growing experiential knowledge, “with the movement of the earth, groundwater was diverted... if in the past water ran in that direction [pointing out to the right], as the earth moved it ceded to the other direction [pointing out to the left] and swerved to the other side, which runs to the other side. And then we must seek new water again”²⁷. Pedro, a worker in one of the three water trucks of the Ránquil municipality, explained that there are daily requests to provide potable water to new families who are losing their groundwater in this commune. A similar analysis was made by Gonzalo in the town of Quirihue: “Since the earthquake of February 2010, a shift in the groundwater occurred in the commune, and that has led to groundwater diversion. Also, a lot of ground water dried up and that has led to many farmers who originally had water, no longer having it. Therefore, there is a large water deficit in various sectors of the community”²⁸

Sol is a destitute peasant who lives on a small plot in the commune of Portezuelo. She is one of the thousands of peasants without water mentioned by Pedro and Gonzalo. She also said that after the earthquake of 27/F there was pronounced reduction in the water levels in the aquifers. In addition, Sol mentioned that the little water they got after the earthquake was dirty, “kind of yellow water”. Sol explained that she and her family (husband and son) got sick when they drank that dirty water, which was probably mixed

²⁷ Pedro, Water Truck Worker, Ránquil commune, Biobio. This interview was done on board the water truck, September 24, 2014

²⁸ Gonzalo, Public Official, Municipality of Quirihue, Biobio. Interview conducted in the commune of Qhirihue, September 30 of 2014

with sediments and other underground materials. Sol is not the owner of the small plot on which she lives, but is an *ocupante* (squatter) on state land (*tierra fiscal*), which in any case is surrounded by pines and eucalyptus plantations. As she does not own the land, she cannot dig another well on the property because that must be done by the landowner, a procedure that includes informing and requesting permissions from the Water General Directorate (DGA). Therefore, after the 27/F earthquake, Sol requested water from the neighbor, a rich landowner. To do so, she had to walk a couple of miles and then manually load water containers on her horse cart. Sol did this for a while after the earthquake, but she told me that she got upset with this situation because she spent a lot of energy and labor on this daily chore. Moreover, the rich landowner was not sympathetic with Sol, making it increasingly difficult to obtain water. So she decided to request help from the local authorities in Portezuelo's municipality. After some bureaucratic procedures (including registering her ID, address, family data, etc.), she was granted free service two or three times per week of water delivery by the municipal water trucks. To do so, the municipality provided her with two water casks of around 500 liters each. "Those [casks] were provided by the last mayor Mr. Modesto Sepúlveda before he left the office. This is potable water of course, but I have to carry it. [For instance] If I run out of water here [kitchen] and I have to wash something else, then I have to carry the water in a pail over here for me to stay closer. Otherwise I have to get the water in small pails (...) I have never had tap water here"²⁹

²⁹ Sol, peasant without water, commune of Portezuelo, Biobío. Interview conducted in the commune of Portezuelo, September 25 of 2014.

After my interview with Sol, I went to the municipality of Portezuelo, wherein I interviewed some professionals working in the PRODESAL Program. They told me that in 2014, many peasants and small-farmers from this commune rejected the “gifts” given annually by CORMA, which consists in pine and eucalyptus trees to reforest their lands. This is a system in which the large and medium forestry companies provide thousands of plants to campesinos, and after 10 or 20 years, CORMA buys pines and eucalyptus from these peasants. If during the statist forestry project (Frei, Allende) the government managed these reforestation programs, during the neoliberal forestry period this is a private service. Isabel, one of the PRODESAL professionals, said that for economic reasons campesinos accepted this system in the past. However, currently the peasants are afraid of the lack of water and for that reason they do not want to reforest with pine and eucalyptus anymore. “Every year [CORMA] donates around 15,000 pine trees [for the commune]. Hopefully they want we receive much more, but we are not obligated to do it. What happens is that there is an agreement, by which every year during the season to plant pines, the CORMA sends us an email to coordinate the transfer of pine trees to us, and then we allocate those pines to the commune’s peasants. Well, in any case they are very friendly, have never been arrogant, stuff like that, but lately we are trying to avoid them, because as you know our commune is coastal and dry and it has plenty of water shortages”³⁰ These campesinos mentioned by Isabel still own land, unlike Sol, who is a peasant with neither land nor water. But the majority of them are being dispossessed of

³⁰ Group interview to the PRODESAL team, commune of Portezuelo. Interview conducted in September 25 of 2014

their water sources, with the population of individuals without water always increasing growth due to the of forestry plantations in the area.

Upstream from the Itata river basin there are also forestry plantations. The community of Pinto is located there, where Camila and her family live. Her family includes brothers, her mother, her husband and her children. They live on a small plot located next to a forestry plantation. One of Camila's brothers works for this forestry plantation. This poor rural family has also been without water since 2011. Unlike Sol, they were provided with water casks (pounds) by the forestry company, but they are serviced by the municipality of Pinto (Figure 3.4)

Figure 3.4: Water pounds provided by the government and forestry corporations



Government water pounds, commune of Ninhue



Forestry companies' water pounds, commune of Pinto

These cases illustrate how the hydrosocial metabolic rifts associated with forestry development are expanding to different areas of the Itata river basin, and continuing to grow, with locations ranging from the coastal cordillera and central valley agricultural lands, up until the foothills of the Cordillera de los Andes, in which there are still vast areas of native forests.

One of the most traditional agricultural activities of campesinos in the Itata river basin has been the production of artisanal wines, particularly downstream. Many of these small wine producers have already sold their land to forestry corporations, but many of them have resisted the large amounts of money offered by the forestry corporations for their plots. Carlos is one of them. He owns seven irrigated hectares in the Ránquil commune, in which the Nueva Aldea industrial complex is located. He said that Forestal Arauco offered to buy his land, which contains both grape crops and a small size wine factory. However, Carlos knows their intentions: “They want to buy large tracts of land for planting pines and eucalyptus, [but also land] to build more modules for wood processing. Hopefully, they want to buy almost everything around to make a big monopoly, because here there are roads and highways to everywhere, near Concepcion, where the [main] ports are located. So they have accessibility”³¹. The Forestal Arauco offer for Carlos’ land was over the market price, but Carlos refused it because he is an opponent of the forestry project. He prefers to produce wine instead of pine and eucalyptus. Jessica, the PRODESAL of Coelemu commune³², also mentioned this sort of “land harassment” suffered by small wine producers and other peasants from this commune, which is oriented towards obligating peasants to sell their lands to the forestry companies and their expanding cellulose plants.

³¹ Carlos, artisanal wine producer. Interview conducted in the commune of Ránquil, Biobio region, September 24 of 2014

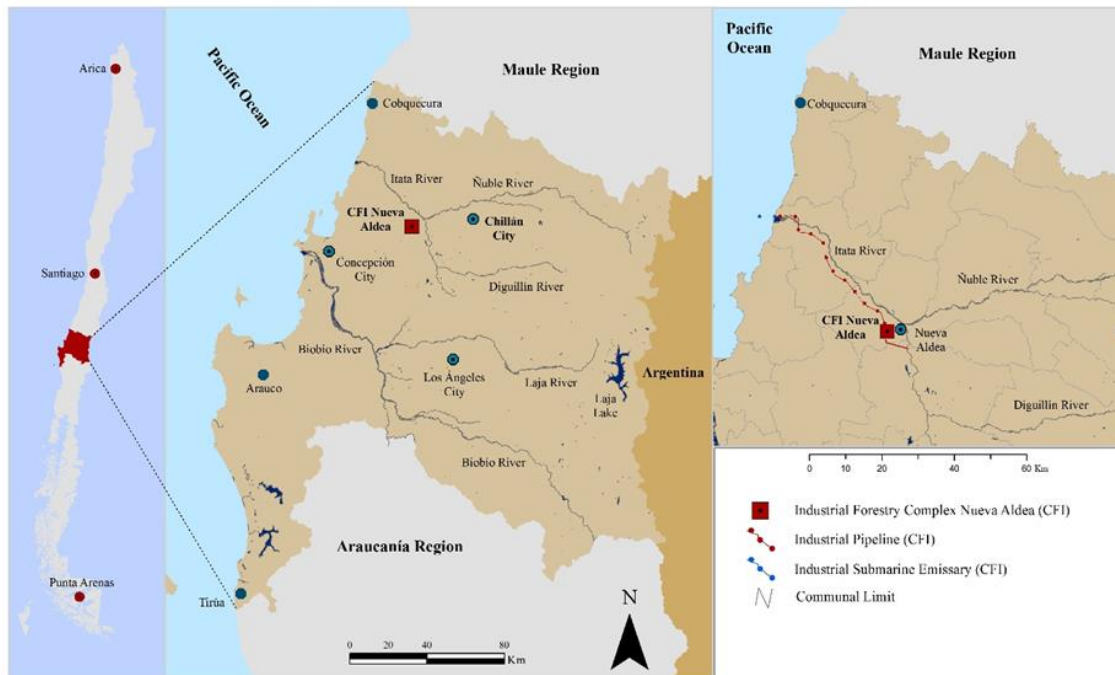
³² Interview conducted in Coelemu, Biobio region, September 23 of 2014

3.4 Water dispossession: the Nueva Aldea pulp plant

On September 1 of 2006, the new Complejo Forestal Industrial Nueva Aldea (Industrial Forestry Complex Nueva Aldea) began to operate in the Itata river basin. This is the best example of the scaling up of forestry production in these valleys and the Biobio region, which now contains four industrial forestry complexes³³. As described above, Laja was the first forestry industrial complex in the nation, owned by CMPC and operational since 1959. Arauco was constructed by Frei (1967) but privatized by Pinochet in 1979. Santa Fe is also from CMPC and has been operational since 1991. It represents the first forestry complex constructed during the neoliberal forestry project's era. The Nueva Aldea forestry-industrial project was announced during the 1990s, but its Environmental Impact Assessment Study (EIA) was only approved in January of 2001. Since then until September 2006, the industrial complex was constructed in the strategic intersection of the Itata and Ñuble rivers (Figure 3.5), a rich area in terms of the water availability that is completely necessary to feed the productive processes involved in the industrial forestry complex (Romero et al, 2007).

³³ Laja, commune of Laja (CMPC), 1959; Arauco, commune of Arauco (Forestal Arauco), 1967; Santa Fe, commune of Nacimiento (CMPC), 1991; and Nueva Aldea, commune of Ránquil (Forestal Arauco), 2006.

Figure 3.5 Nueva Aldea Forestry Complex, Itata river basin, Biobio region



Source: Center for Environmental Sciences EULA-Chile

In the middle of its construction, during August 2004 to January 2005, the Regional Environmental Commission of Biobio (COREMA Biobio, since 2010 Ministry of Environment) detected a series of irregularities during the Phase 1 (Stage 1) in the construction of the forestry project, during which a sawmill and a plywood mill plant were constructed. Many of the irregularities were associated with environmental problems caused by the new industrial installations, such as noise, illegal native forest logging, landscape harmonization, and sewage treatment, among others. For these reasons, Forestal Arauco had to submit a new EIA during August 2004, which was finally approved in March 2005. This allowed for the cellulose plant to be constructed. It was the last stage (phase 2) of this 19 hectare industrial complex.

In light of the new forestry development in Biobio, between 2005 and 2007 thousands of people protested in cities such as Cobquecura, Trehuaco, Coelemu, Chillan and Concepción against this forestry industrial mega-project. The protesters argued that the new forestry industrial complex was going to disrupt their quiet lives, destroy the environment, and pollute both the Itata river and coastal seawater. The groups of protesters were composed mainly of small producers of traditional wines (Carlos was one the leaders), campesinos, small farmers, students, activists, public officials, surfers, and artisanal fishermen from the coastal area. They were concerned about the potential hazards posed by Nueva Aldea for the water quality of the Itata river downstream from Nueva Aldea.

The Itata river flows 50 km downstream from Nueva Aldea in Ránquil to the coastal area of Pacific Ocean, through the communes of Coelemu, Trehuaco, and Cobquecura. Opponents of Nueva Aldea argued that both continental (surface and groundwater) and sea water were being threatened by the wastewater that Nueva Aldea was going to discharge into the Itata river. Over more than three years (September 2006 until December 2009), Nueva Aldea discharged industrial wastewaters directly into the Itata river, which was supported by COREMA Biobio under the condition that those wastewaters were treated properly within legal limits and parameters. In the meantime, Nueva Aldea constructed a “ducto” (pipeline), composed of both an industrial pipeline (50 km) and an industrial submarine pipeline (2.5 km), to direct industrial sewage directly into the sea (Figure 3.5). This pipeline began to operate on December 5 of 2009. This explains why farmers, artisanal fishermen, and surfers were involved in protesting against Nueva Aldea (both the cellulose plant and its pipeline). They argued that this

industrial complex was going to pollute and destroy their crops and livelihoods, including the grapes for wine and marine resources people depend on.

Their concerns were soon realized. Only one year after opening wastewater pipeline (*ducto*), on December 2010, this pipeline suffered its first leak and contaminated the Estero Velunque located beside the Nueva Aldea forestry plant, in front of which is also located the Nueva Aldea rural village, which is inhabited by 300 people (Figure 3.6). The figure shows the Estero Velunque (top), the Nueva Aldea forestry plant (bottom left), the village of Nueva Aldea along with the Itata river (right, top), and the Itata highway (“Autopista del Itata”) toward Concepcion and Chillan (bottom right,).

Figure 3.6: Nueva Aldea Industrial Forestry Complex



Source: Google Earth, 2016

The pipeline leaked wastewater in the Itata River again in 2013. This time, the industrial sewage contaminated both the Itata River and aquifers in an area of the estuary, which is occupied by campesinos, farmers, and artisanal fishermen. Campesinos and fishermen from Cobquecura, Trehuaco, and Coelemu, all communes located in the

basin's coastal zone, were particularly affected. These campesinos, dedicated mainly to cultivating potatoes, beans, and other subsistence crops, lost their water sources for both domestic use and their micro-scale irrigated agriculture. This happened because their wells were contaminated by the industrial sewage, which filtered through the underground water channels and reached their aquifers³⁴. The farmers living in the estuary area lost their access to potable water. They were dispossessed of the most elemental natural condition for their existence: clean water. For this reason, like Sol, they began to be serviced by municipal water trucks once or twice per week.

Matías and Nancy are one of the families affected in this area³⁵. Matías recalled that his father never received land during the agrarian reform, though he worked all his life on a fundo in the area of Trehuaco. Matías also said he worked for the patron as part of the inquilinaje exchange. This fundo was never expropriated during agrarian reform, and Matías has always worked for its owner, an elderly woman. In exchange for almost a life of service, years ago this landowner sold one hectare to Matías, on which he lives today with his wife Nancy. On this hectare Matías cultivates potatoes, beans, and other crops. Nancy is occupied with raising chickens and a small greenhouse. Matías also has a small boat with which he fishes in the area of the intersection of the Itata river with the Pacific Ocean. These two activities, farming and fishing, were destroyed by the contamination of the Itata river by the industrial waste water of Nueva Aldea. He cannot fish anymore

³⁴ On the relationships between surface and ground water in Biobio, see Arumi et al, 2012

³⁵ Matias and Nacy, group interview conducted in Trehuaco, September 24 of 2014

because there was a significant reduction in the marine resources in the area after the pipeline leaks in October and November of 2013.

“The company is polluting us, [but] they do not recognize it, but yes, we are contaminated [...] Years ago, when [Forestal] Arauco was dumping [wastewater] in the river, we had a big rain here. There was a week of rain, five days without stopping, then it rained and stopped, rained and stopped, and so on, and the [Itata] river overflowed. For about three days here, the animals did not have anything to eat, the water entered inside here and then it went out over the beaches. There was pure water, but those *riles* [polluters] that Forestal Arauco was pouring into the river, that pollution remained here in the *vegas* [wetlands]. The pollution is still here! And there isn’t an in-depth study, particularly to know what the chemicals are. They [authorities, company] have done studies but the results only show feces, which comes from both animal feces and our own waste [...] For that reason they say that the water is unfit to drink it, but they have never studied the *riles*. Those studies have never done, and if they do, we do not know of them, because studies are paid for by [Forestal Arauco]”³⁶

Matias cannot cultivate anymore because the groundwater he pumped to irrigate his crops was contaminated by the infiltration of the aquifers with Nueva Aldea’s industrial waste water. And for this reason, both Matías and Nancy cannot drink the water from their well anymore. They have been dispossessed from their water and livelihoods as a result of corporate negligence.

³⁶ Matias and Nancy, interview conducted in Trehuaco, September 24 of 2014

Like thousands of peasants in Biobio, they have been unwittingly suffering the estrangement of the natural conditions of their existence by capitalist production based on the neoliberal forestry project, and therefore, the material conditions for living a sustainable life have been violated for them (Foster, 2009: 182-183). The forestry geographical project which in the past presented itself as a sustainable alternative to coping with soil erosion, and even to supporting social reform such as during the agrarian reform, is now producing unprecedented socio-environmental destruction of the Itata river basin. Multiple metabolic rifts are being produced as forestry production expands its material damages into the hydrosocial relations of Biobio and other territories in southern Chile. This chapter has only described some of them in an exploratory way. Neoliberal forestry development is becoming synonymous with environmental destruction and new waves of campesino dispossession.

Final remarks: forestry geographical project, hydrosocial metabolic rifts, and the neoliberal state

During almost one century (1931-2015), the state and private corporations have expanded their forestry geographical project in Biobio and southern Chile, producing new socio-natures in the process. This geographical project has been, consistently, a project reflecting Chilean capitalist elite class interests. This was present during state-directed forestry development (1931-1973), but was especially egregious during the neoliberal forestry developments since 1974 and onwards. The elite class' interests are materialized by Decree Law 701.

This neoliberalization of forestry development has produced contradictory socio-spatial outcomes. On the one hand, large-forestry corporations owned by the elite are getting more and more profits with their expanding forestry plantations and forestry industrial complexes constructed in the region, oriented towards global markets. The economic outcomes of forestry development are outstanding (but only for corporations, not for their workers). On the other hand, the expansion of these forestry production chains are engendering multiscale metabolic rifts, based on land dispossession, destruction of native forests, the degradation of lands and aquifers, and a general degradation of the rural forms of life and the environment in Biobio. The elites, who own the means of forestry production, which was dispossessed from public property during the dictatorship, are getting richer. The local peasants are getting poorer, having neither land nor water.

This production of uneven geographical development driven by neoliberal forestry is driving me to question the logic of the Chilean neoliberal state because it has been the central actor, the instrument of elite class interests, to catalyzing this forestry geographical project in southern Chile. Indeed, the new hydrosocial configuration is highlighting the contradictory nature of the Chilean neoliberal state.

On the one hand, this subsidiary state is obligated to govern, or try to manage, the hydrosocial metabolic rift represented by the increasing population of peasants dispossessed of their direct access to and control over water. The Chilean state must create the conditions that allow for the production and reproduction of life's material conditions for these rural populations. The water trucks and the mobilization of state resources to transport potable water to these dispossessed rural populations are examples

of this³⁷. On the other hand, the Chilean neoliberal state uses subsidies to finance the elite's forestry corporations through DL 701, which is precisely producing the multiple metabolic rifts into the hydrosocial relations of Biobio and southern Chile³⁸.

In other words, the Chilean neoliberal state is financing the production of socio-environmental destruction, and at the same time is obligated to allocate resources to fix the environmentally degradation. Or at least, it is obligated to generate the minimum conditions for the social life of rural people. The politics of dispossession is not only a politics of transferring state resources to the large corporations, but also one of covering the social costs of the environmental degradations produced by the forestry geographical project. Paraphrasing David Harvey and John Bellamy Foster, I would conclude this chapter by saying that forestry development is, increasingly, a politics of water dispossession combined with a (forced) politics of restoration of the hydrosocial metabolic rifts. The state contributes to both socio-environmental destruction and attempts to fix these socio-environmental transformations. In the process, the Chilean state and forestry corporations are producing new water subjects, in the form of

³⁷ I will return to this problem when I discuss issues of the growing governmentalization of the Chilean state in water affairs (chapter 5)

³⁸ However, as noted above, there is an increasing amount of social discontent and opposition to the renewal of DL 701 among public officials, scholars, environmentalists, and rural populations (especially Mapuche people). The President of Chile, Michelle Bachelet, said during her annual account to the nation on May 21, 2014 that her government (2014-2018) was going to send a draft of a bill to congress for the approval of the extension of DL 701 for 2 more years (Navarro, 2014). This opened a public discussion in light of these State policies of continuity with the neoliberal forestry policy. In turn, this discussion is allowing for the emergence of increasingly large social groups who oppose the neoliberal forestry project and demand the dissolution of DL 701 (Universidad Austral de Chile, 2015). This is opening increasing social struggles against forestry development, which have been historically supported by the Chilean state by giving benefits to the elites through DL 701, via dispossessing public assets and legally redirecting them for the benefit of the richer capitalist families in the nation. See Carvajal, 2015

marginalized peasants without land or water. In other words, the neoliberal estate and the neoliberal forestry project are producing uneven geographical outcomes, and therefore producing the conditions of increasing political struggles over water in Biobio and elsewhere, particularly in Mapuche lands.

In the next chapter I focus on water struggles associated with irrigation development in Biobio but mainly on the Santiago region

CHAPTER 4

IRRIGATION DEVELOPMENT AS HYDRO-MODERNITY: RECONSTRUCTING LIBERAL, KEYNESIAN AND SOCIALIST HYDROSOCIAL ASSEMBLAGES IN THE MAIPO AND ITATA RIVER BASINS

Introduction

In this chapter, I focus the analysis on irrigation and the development of water user organizations in the central valleys of both the Maipo and Itata river basins. Speaking historically about Chile, irrigation development started earlier (early 19th century) than dams and hydroelectric development (late 19th century). For that reason, in this and chapter 5 I address irrigation development, while hydroelectric and anti-dam developments are discussed in chapter 6. During the second half of 20th century, frequently these water developments or hydro-modernities (Swyngedouw, 2015) collided one to each other in several Chilean river basins. Since then, some of these encounters have generated conflicts and disputes over the uses of the water stored in these reservoirs (Bauer, 2009). Some of these conflicts between hydropower and irrigators will be analyzed in chapter 6.

My objective for this chapter is to describe how the historical-geographical development of irrigated agriculture in both the Ñuble and the Maipo river basins, has created a multiplicity of canal networks, and at the same time, institutions, shared norms, rules, and complex networks of social power associated with water user organizations, all of whom are key actors in water management at both river basin and national scales.

Currently, these organizations are powerful actors who are opposing water reforms undertaken by the government of Michele Bachelet in 2014.

To understand these current water struggles it is necessary to explore how in the past these irrigators constructed their networks of social power for governing water and river basins. According to my fieldwork results and the literature review, the socio-ecological history of the irrigators' organizations can be traced back to water works associated with canal construction. Although these canal developments have ancestral roots because they were initiated by indigenous people and were continued during colonial times, the main canal infrastructures were actually developed and modernized during the 19th century (Bengoa, 1988). Because of these canals, both irrigators and power elites managing the state apparatus began to craft different norms and rules for governing water used for irrigated agriculture in Chile. These institutions have maintained a certain pattern until today; specifically one of private property rights over water which is currently being challenged by the water reform of 2014 (Delegacion Presidencial para los Recursos Hidricos, 2015)

My ambition is to analyze how these material hydrosocial assemblages were developed, and in doing so, emphasize how the history of water user organizations is also the history of the contested nature of (consumptive) water rights and water institutions in Chile. One of the key research findings is that these centenary controversies about the fair distribution of water rights within the canal networks remain today. Specifically, I refer to the controversies affected by ecological variations in water flows in the rivers

associated with (long term and seasonal) droughts. This climatic change factor is also central to understanding old and new water struggles and water reforms.

The analysis of the contested and contestable nature of the private ownership of water rights emerged gradually from my fieldwork in Chile, first in Patagonia, then in Biobio and finally in Santiago. After interviewing dozens of peasants, farmers, directors and managers of water user organizations, I became aware of a key common knowledge that circulates among Chilean stakeholders involved in irrigation. According to this knowledge, water always has been private property in Chile. It only was able to be (momentarily) captured by the state as a “public good” thanks to the reformist and revolutionary time period of agrarian reform (1964-1973). During this brief period, the 1967 Water Code was enacted which for the first time nationalized all the water resources. In effect, “the 1967 amendment [...] declared *all* the nation’s waters to be “national property for public use,” including waters that ha[d] been considered private since the 1855 Civil Code: streams and lakes contained within a single landed property and, more importantly, waters flowing in artificial channels, or canals. In short, the amendment allowed the expropriation without compensation of all existing private water rights” (Bauer, 2004: 39). As we will see below, this “expropriation without compensation” is one of the main fears of irrigators and water user organizations in light of the current 2014 water reform (El Campesino, 2014: 15; El Campesino, 2015:17)³⁹

³⁹ “El Campesino” is a magazine of the *Sociedad Nacional de Agricultura* (National Society of Agriculture), which publishes regular news about Chilean agriculture from the standpoint of large farmers. In this respect, it does not represent the “campesinos” perspectives at all.

My analysis of the interviews reveals how irrigators, scholars and public officials associated with the irrigation sector referred to these histories of primitive accumulation of water rights in the nation during the colonial (1541-1810) and post-colonial times (1810 and onwards). Lucas⁴⁰, an agricultural engineering expert in irrigation and water user organizations summarized this history very well by saying that the “Water Code of 1981 is a consequence of a historical process that comes from the colonial era, even before colonial times, and since then it has been advancing a privatized model of water rights. No doubt, the 1981 Water Code is a consolidation of this historical process”. In my visits to the different valleys and communes of the Maipo and Itata river basins, large farmers also claimed that their (consumptive) water rights can be traced back to the 19th century and even earlier than that, when the Spanish government (1541-1810) and then the new Republican government (1818 onwards) allocated water through “Mercedes de Agua”, that is, official permissions (and titles) to use water for both irrigated agriculture and domestic consumption (Piwonka, 1999; Arumi et al, 2014)⁴¹. According to the specialized literature, the irrigators’ claims are a matter of successive historical-geographical facts. Accordingly, it is important to reconstruct the socio-natural metabolism of these facts in the analysis of the water struggles in Chile, particularly as a central background for framing the emerging debate on water commons and water markets which has been highlighted by the reform to the 1981 Water Code proposed by the Bachelet government in 2014.

⁴⁰ Interview conducted in November 6th of 2014, Valparaiso city.

⁴¹ They also allocated “Mercedes de tierras” or “Mercedes de sitio”: official permissions and titles of land for agriculture and subsistence (Salazar, 1985; Arumi et al, 2014)

I suggest a division of five historical stages to advance an argument that irrigation development has been (and it will continue to be) important in producing hydro-modernities: that is, subjects with the right and access to water, in this case for irrigation purposes. Nonetheless, I also argue that although irrigators are important, they are not the only actors managing water (as often they think they are) at the river basin scale⁴².

The historical stages are the following: **1) Liberal hydro-modernity (1541-1888); 2) “Keynesian” hydro-modernities (1888-1963); 3) Reformist and Socialist hydro-modernities (1964-1973); 4) Neoliberal hydro-modernity (1980-2015);** and I suggest, **5) Commons hydro-modernities for the 21st Century.** This chapter discusses until the stage 3 (Reformist and socialist hydro-modernities), while chapter 5 analyzes what I am calling neoliberal and in chapter 6 commons hydro-modernities. These three chapters can be seen as a unity. I do not intend to analyze in detail each one of these historical stages because I am aware that it is not possible in the space available for this chapter and even this dissertation. Here and in the next chapters, I only want to emphasize some important events and processes that occurred in these stages, in order to explain the current water struggles around the public domain of water and why irrigators fiercely oppose Bachelet’s current water reforms. However, I also balance this official irrigator opposition by exploring how some groups of irrigators are open to negotiating their old concepts of water as a private property, in order to navigate towards notions such as water commons being oriented towards democratizing water governance at the

⁴² I will illustrate better this point in chapter 6 analyzing hydropower development and anti-dams activists

river basin and national scales. According to my research results, growing groups of irrigators recognize that they share the water resources with other important river basin stakeholders, and as such they are far from neoliberal orthodoxies. Instead, they are more closely aligned to balanced visions that recognize that the state and other stakeholders (e.g. environmentalists, hydropower, forestry industry) can play important roles in the collective construction of sustainable and democratic modes of water governance at the river basin and national scales (chapter 5)

The chapter is organized as follows. First I explain how the development of irrigated agriculture and canal construction was also a process of institution-building through norms and rules to govern these emerging hydrosocial networks. This was done through the creation and institutionalization of water user organizations, which began in Santiago (Bengoa, 1988: 178) and then expanded to the rest of the country, particularly to the southern lands including the Biobio and Nuble river basin. Inquilinos and peones (and also prisoners) were the main labor force working for the landowners in extending and consolidating canal networks during the 19th century (Sociedad Canal del Maipo, 1997) (section 1). Then at the beginning of the 20th century, the state took increasing control of water affairs as a consequence of the urbanization of cities and sanitation problems (sections 2). These water policies were accompanied by the parallel developments of both water user organizations and the protests of inquilinos, peones, and independent campesinos, who struggled and then were rewarded with the policies of the redistribution of land and water rights made by the state (CORA) during the agrarian reform of Frei and Allende (Salazar, 2012: 127). Finally, these campesinos were the main social groups

dispossessed from their lands and water rights during the counter-agrarian reform of Pinochet (Bellisario, 2007a, 2007b; Klubock, 2014), which ended with the 1980 Constitution and 1981 Water Code (section 3), with which I close this chapter 4.

1. Liberal hydro-modernity (1540-1888)

This first period endures for most of 350 years, stretching from the founding of Santiago city in 1541 to the creation of the first Drinking Water Company of Santiago and its sewage system in 1859-1860. For these first three centuries, in the Chilean capital of Santiago it was “impossible to separate the history of irrigation from water for human consumption: they [were] one and the same” (Piwonka, 1999: 15, 18). Another important event that closes the period that I have termed liberal hydro-modernity was the canalization of the Mapocho river in 1888 (Castillo, 2014, see section 2). In addition, during these colonial centuries there were also recurrent droughts which strongly influenced public water projects related to constructing new urban pipelines and canals designed to quench the growing thirst of the city and the growing need to irrigate lands and increase agricultural production.

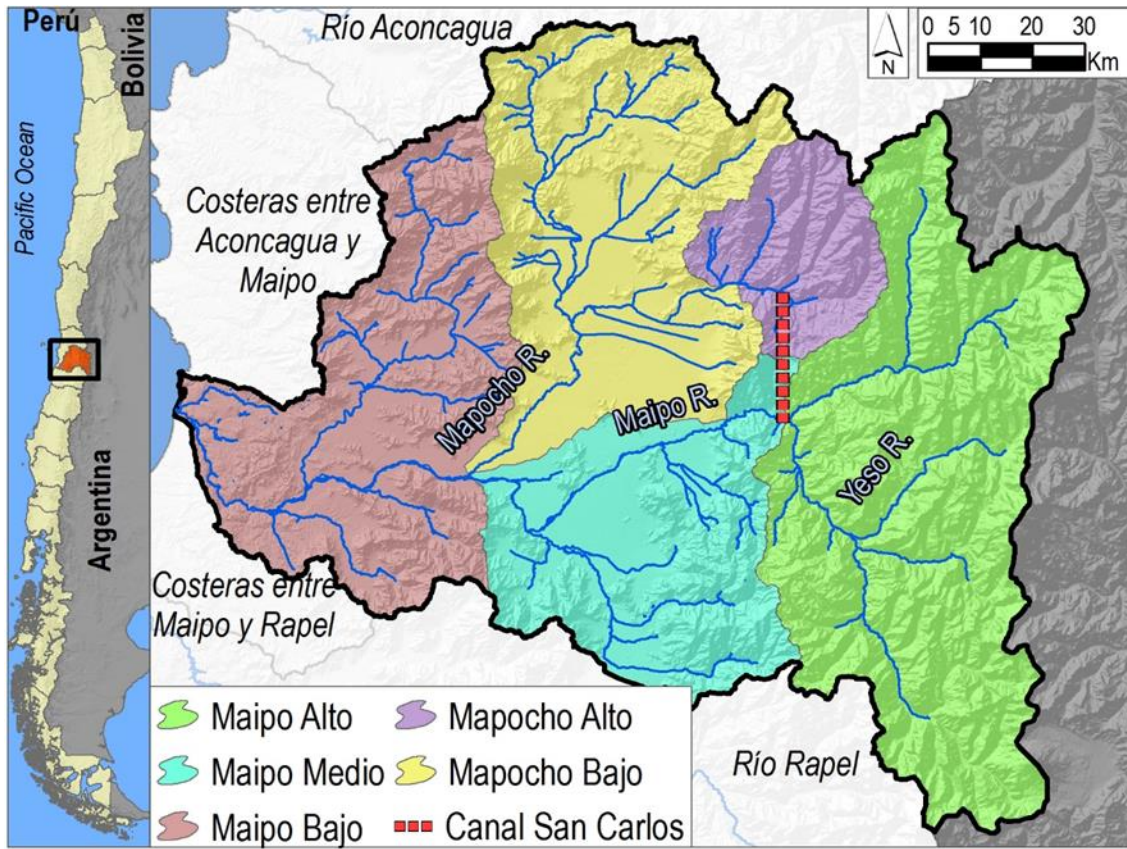
1.1 Irrigation development and water dreams in the Maipo river basin

The Maipo river basin ($32^{\circ}55'-34^{\circ}15'S$, $69^{\circ}55'-71^{\circ}33'W$) covers an area of 15,504 km^2 , which includes practically the entire Metropolitan Region of Santiago, within which is located Santiago city ($33^{\circ}27'S$, $70^{\circ}42'W$) and a small portion of the both the Valparaiso and O'Higgins regions. Currently, the Chilean capital is the most important

urban center in Chile in terms of its population (more than seven million people), financial and political power, as well as its cultural, educational, and industrial activities (Ahumada et al, 2013: 28). The main river is the Maipo, which begins in the Andean mountains (San José Volcano, 5,848 m) and then runs 250 kilometers to the Pacific Ocean (Valparaiso Region) (Comisión Nacional de Riego, 2009a: 3; Meza et al, 2015: 10). The second most important surface water body in the Maipo basin is the Mapocho river which, unlike the Maipo, crosses Santiago's urban core—also known as *Gran Santiago*—from east to west, discharging into the Maipo river in the communes of El Monte and Talagante. Other important tributaries for the Maipo river are the Colorado, El Yeso, El Volcán, and Clarillo rivers, all of them beginning upstream in the Andes cordillera in the commune of San Jose de Maipo⁴³, with the exemption of the Clarillo, which is located mainly in the commune of Pirque. The Colina river (Colina's commune) and the Estero Pangué (communes of Curacaví, María Pinto and Melipilla) are also important tributaries for the Maipo, and they are located downstream in the area north and west of the basin (Figures 4.1 and 4.2)

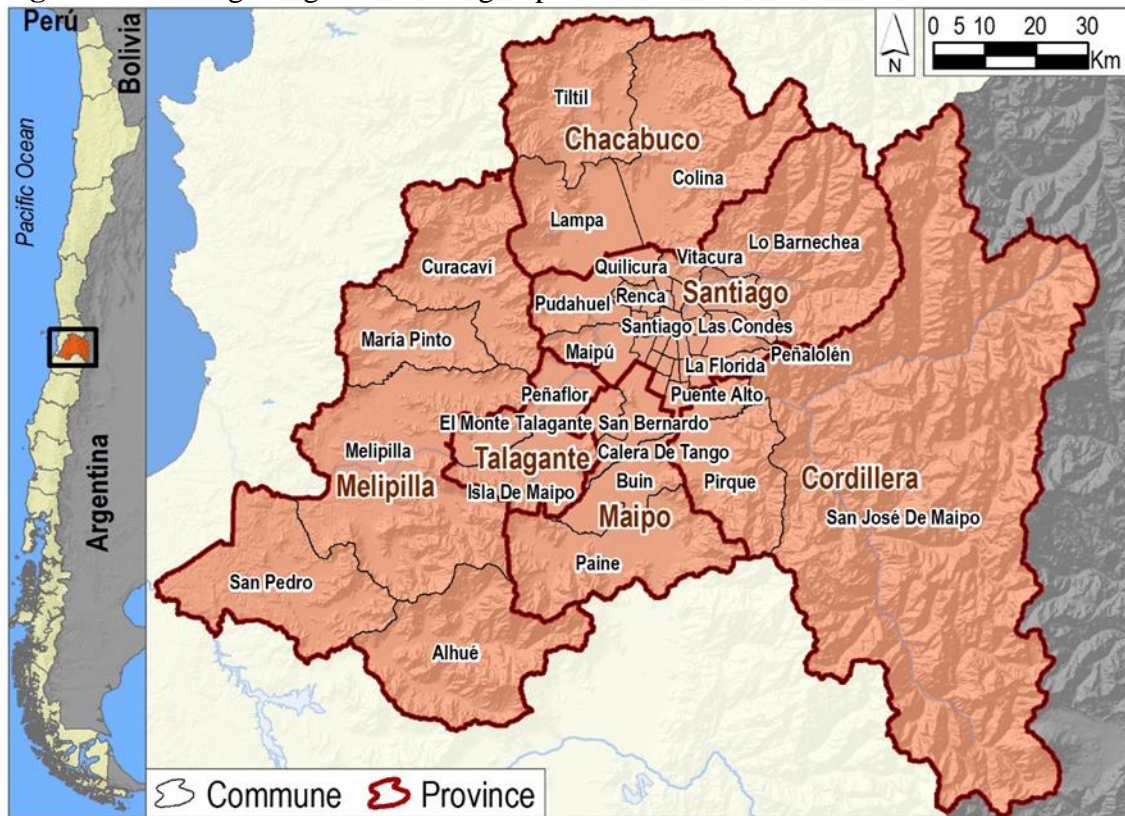
⁴³ As can be observed in the figure 4.2, San Jose de Maipo is the largest commune in the Metropolitan Region of Santiago, covering a surface of 5.070 km², or 32.7% of the Maipo river basin

Figure 4.1: Maipo river basin: main tributaries, sub-basins, and canal San Carlos, Santiago Region



Source: Center for Environmental Sciences EULA-Chile, Universidad de Concepcion

Figure 4.2 Santiago Region according to provinces and communes



Source: Center for Environmental Sciences EULA-Chile, Universidad de Concepcion

According to the Agricultural Census of 2007, irrigated agriculture developed in the Maipo river basin covers an area of 136,732.34 hectares (INE, 2007). But the canals and social organizations that sustain all this irrigated agriculture have a long history that can be traced back to the indigenous canal networks that already existed when the Spaniards, led by Pedro de Valdivia, founded Santiago city in 1541.

The colonial era: droughts and Santiago as a thirsty city

Santiago was founded around the Mapocho river. This area was previously inhabited by local indigenous groups (e.g. Picunches), who were strongly influenced by

other indigenous groups from Peru (Incas). These indigenous groups developed an incipient but complex network of canals to irrigate the crops in the Mapocho basin (Bengoa, 1988: 173-174; Comisión Internacional de Riego y Drenaje, 1997: 27; Stehberg et al, 2012). When the Spanish conquerors arrived, they rapidly adapted these previous canal networks because “they served to limit the properties and represented good opportunities for cropping” (Villalobos et al, 1990: 30). This was facilitated “thanks to the influence of the Moors and their expertise in water engineering, [which allowed that] the Spanish, upon their arrival, began to build on the existing Inca channels by creating a network of ditches and secondary channels that would allow the water to be transported along the streets of the city” (Pflieger, 2008: 21).

During these first decades of Santiago city, the supply of drinking water came from the Mapocho river, which at the time was enough to satisfy the needs of the small city’s population. However, since the late 16th century and onwards, urban development and the semi-desert climate of these latitudes⁴⁴ have created the need for more water security for the inhabitants of the city. The Mapocho was not enough to satisfy the city’s demand for water during the colonial era (1541-1810), mainly due to the fact that these centuries were affected by constant droughts (Sociedad Canal del Maipo, 1997; Piwonka, 1999). In effect, during the colonial era, people from Santiago developed at least two

⁴⁴ Santiago is located in a Mediterranean climate with marked seasons of at least six months (October-March) without any precipitation. This Mediterranean climate covers 1/3 of central-south Chile—from Santiago to Los Lagos region—precisely the central Valley in which irrigated agriculture has historically developed. The northern climate is dry (Atacama Desert) and in the Austral Patagonia region the precipitation lasts almost all year.

meanings for “drought”. The first was developed between the 16th and 17th centuries, and it referred to a *lack of rainfall*, which mainly affected natural pastures, the food for producing and reproducing livestock. The second meaning was developed particularly during the 18th and 19th centuries (the “cereal centuries”), and it referred to the *lack of water coming from the Andean snowmelt*, which mainly affected the cereal producers and irrigators located downstream of the Mapocho and Maipo rivers (Piwonka, 1999: 70). This lack of precipitation and Andean snowmelt also produced drinking water scarcity and sanitation problems for the people living in urban Santiago. The following quote reflects this intermittent but constant water scarcity in colonial Santiago:

“The city was dying of thirst, and the fields were barren (...) Located in the middle of a vast, arid land, placed in front of the Andean cordillera, whose desiccating air dominates, and watered only by the Mapocho river (...) it absolutely lacked rain during the summer and autumn. For this reason its inhabitants are constantly afflicted with diseases generated by the dryness of the atmosphere, and their lives rarely reach that length that make those who live in other provinces in the same country. The population does not grow, and many abandoned lots are visible in the lower part of the city, lots which were built when the waters of the river, less divided, were capable of watering them” (Vicuña Mackena, 1869: 36)⁴⁵

⁴⁵ My translation. Original in Spanish: “La ciudad se moría de sed, y los campos de esterilidad...Situada la capital...en medio de un vasto y árido terreno, colocada al frente de la cordillera, cuyos aires disecantes la dominan, y regada sólo del río Mapocho...por carecer aquí absolutamente de lluvias en el verano y otoño: por esta causa se ven sus habitantes continuamente mortificados de enfermedades originadas de la sequedad de la atmósfera, y sus vidas rara vez llegan a aquella duración que logran los que moran en otras

The constant droughts created serious problems for the urban and rural areas of Santiago during the colonial era. The quote shows how the Mapocho river constantly failed to satisfy the domestic and agricultural demand for water. For this reason, in 1709 the governor of Santiago, Juan Andres de Ustariz, wrote a letter to the King of Spain requesting resources to begin the construction of a canal to transfer water from the Maipo to the Mapocho “citing economic and sanitary reasons” (Comisión Internacional de Riego y Drenaje, 1997: 29). This is the early antecedent of this canal project. It was going to cover the 30 kilometers that separate the Maipo and Mapocho rivers (see Figure 4.1a), which was described as arid and infertile land. This area was envisioned to be irrigated through what was going to be named the “Canal San Carlos”, honoring the Spanish King Carlos III. The main goal was to put “the vast plain situated south of the capital until the Maipo river, which until then was no more than a wasteland” (Villalobos et al, 1990: 32) under agricultural production. These dry and barren lands were also associated with crime and bandits by the ruling classes of landowners from Santiago, a place that served as a “hideout for robbers and murderers” (Graham, 1822: 67)

I consider the Canal San Carlos’ design/construction (1709-1820) and subsequent operation to be a geographical project, a water works program for watering the city, deployed as a quasi-water dream by the Santiago elites. This

provincias aun del mismo reino. La población no crece, y están a la vista en la parte inferior de la ciudad muchos sitios abandonados, que fueron edificados cuando las aguas del rio, menos divididas alcanzaban a fecundarlos”

geographical project was to prove central in structuring future irrigation development and water user institutions in the nation. Even more, the Canal San Carlos was going to be a future model in which rested a new socio-ecological and liberal political order, the *Orden Portaliano* (1833-1925) and then ‘Keynesiano’ (1925-1973) (Salazar, 2012), which would be based on the hacienda system that controlled both irrigated lands and the labor force of *inquilinos* and *peones*.

The Canal San Carlos was designed to water the haciendas and lands located in the eastern part, or the Andean foothills, of Santiago because by then the Mapocho river “lavishly watered the valley, the town, the farms, and vineyards that were to the west [However, in the east,] what today is up to the Avenida Pedro de Valdivia, irrigation had greater difficulties, since it was not possible to lift water from the Mapocho river” (Bengoa, 1988: 174). The canal’s construction was not easy, principally because the 30 kilometers that separate the Maipo and Mapocho were geographically complex (slopes, hard mountain rock), and therefore the costs associated with the canal’s construction were high. For this reason, from the beginning, the Real Audiencia and the Cabildo of Santiago, which was the colonial government of the Spanish king in Chile, supported the first attempts for the canal’s construction with public resources. However, there were decades of failed attempts (1740s-1802) until this canal came to be a reality.

After the letter sent to the Spanish king in 1709, there were no serious efforts to begin the construction until 1743, after periods of strong droughts in 1726 and 1742 (Greve, 1944: 59). The water works began in 1743, but the engineers of that time

calculated incorrectly and the canal was outlined “on a site that turned out to be very low and had no slope for water runoff” (Villalobos et al, 1990: 32). The water works were eventually abandoned because the drought ended and the Mapocho returned to having enough water flow to satisfy the city’s needs (Piwonka, 1999). However, again drought (both lack of precipitation and the lack of Andean snowmelt) affected the city in 1772. Then the Canal San Carlos project was reactivated, but it failed once again. Seemingly, the pitfalls were the difficulties of the terrain, the lack of capital, the poor design and engineering, but also because the labor force used to construct the canal was mainly prisoners (Villalobos et al, 1990: 32; Valenzuela, 1991: 51; Sociedad Canal del Maipo, 1997), which could have affected the productivity of the labor. Finally, in 1796 the water works were initiated again, but the most important actions to definitively construct the canal were undertaken in 1802.

The making of the Canal San Carlos and the rise of water user institutions in Chile

Beginning the 19th century, the new governor Muñoz de Guzmán (1802-1808) took up the canal’s construction as a central goal for his administration. He approved a new plan based on new studies and designs for the infrastructure, by which a new and definitive attempt to construct the Canal San Carlos was undertaken (Valenzuela, 1991: 54). The works were suspended again in 1804 and taken back up between 1811 and 1814. In the middle, Chile declared its independence from Spain in 1810, but the Spaniards regained control after the Battle of Rancagua in 1814. The revolutionaries lead by Jose Miguel Carrera and Bernardo O’Higgins escaped to Argentina and then returned with the

Ejército Libertador to liberate the country again in the Battle of Maipu of 1818, in which Chile officially achieved its independence. The war of independence against Spain (1814-1818) delayed the canal's construction because the peones who were working on the canal's construction during the period of 1811-1814 were drafted by Carrera as part of the troops organized against the Spanish army (Errázuriz, 1854: 71). After independence, the new political authorities led by O'Higgins took the problem of the canal upon themselves (Bengoa, 1988). They understood the relevance of this infrastructure to the development of the "city and the new Republic". Therefore, O'Higgins put new people in charge of the canal project, including Domingo Eyzaguirre, and provided public resources to finish this old water dream for east Santiago (Sociedad Canal del Maipo, 1997). Finally, the canal unifying the Maipo and Mapocho rivers was finished in 1820.

During these two final years of constructing the canal (1818-1820), there were discussions among the future beneficiaries, mainly large landowners, of how the Canal San Carlos' water was going to be allocated and the prices of water shares. Here is, perhaps, the origin of private property rights over water under the Republic of Chile. During the discussion over the allocation of the water from the Canal San Carlos which occurred between the government and the ruling elites (mainly landowners), "the question of defining exactly the amount of water that was meant by the term "regador" [irrigator or sprinkler] was [also] addressed. A regador is the unit of measurement in which the liquid element would be delivered" (Valenzuela, 1991: 77). Therefore, a first step was to define the term and measurement "regador".

In November of 1818, O'Higgins and the Senate defined a “regador” as the “water that passes through a space about a *sesma* [finger] width high and a fourth of that width over a drop of 15 inches” (Bengoa, 1988: 178⁴⁶; see also Valenzuela, 1991: 78; Peralta, 1989). Importantly, the Senate also defined “the prices of the regadores of Canal San Carlos and made some rules about the water divider frames [“marcos partidores”]” (Bengoa, 1988: 178). This definition of regador was going to create many controversies among irrigators (farmers) because “the frame is 9 by 6 inches, that is 54 total inches, but depending on the width and length, a range of regadores from 14.47 liters per second and 28.091 liters per second are obtained” (Bengoa, 1988, p. 179). After decades, in 1856 the Canal San Carlos’s irrigators agreed that a regador is a mean of 32 liters per second, a measure that in 1875 was defined again, when a regador was defined as the quantity of water capable of irrigating 15 hectares⁴⁷. The latter definition was maintained throughout the 20th century (Peralta, 1989: 80-84) by this organization.

In other words, regador refers to the canal design and technology (“marco partidoro”) that allows for measuring the quantity of water that each sub-canal extracts from the main canal, in this case, the Canal San Carlos. This quantity depends on the type and dimensions of the “bocatoma” (water intake) used to extract the water from the

⁴⁶ My translation. Original in Spanish: “el agua que saliera por espacio de una sesma de alto y un cuarto de ancho por el desnivel de 15 pulgadas”

⁴⁷ During the last decades of 19th century and the beginning of the 20th, this definition of regador was taken up by scholars from the Department of Physics and Mathematics from Universidad de Chile and from Universidad de Talca. The discussions lasted for decades until the 1920s, and according to irrigation experts, these controversies around a precise definition of regador remain until today (Arumi et al, 2014)

main canal (“canal matriz”) to the secondary canals (“ramales”), which in turn carry the water to the crops for irrigation.

However, due to the variable amounts of water flowing through the rivers (due to droughts and intra/inter-annual variations in rainfall and snow precipitation), these definitions are always changing, and are a matter of conflict among irrigators until today (see chapter 5).

Beyond these technical problems, the historical relevance of the definition of regador is that when it was approved by the Senate in 1818, it also created the problem of defining the market price for each regador, which were brought by large landowners located in the lands between the Maipo and Mapocho rivers. For instance, by 1873 the Canal San Carlos was divided into 2,233 regadores, each of which cost \$4,000 Chilean pesos (Greve, 1944: 66). However, between 1820 and 1827 this definition was in its early days, when the landowners were doing primitive calculations to price the water flowing through the new channel.

After these primitive water regulations on the regador were enacted, a severe winter of storms, floods, and mud flows affected Santiago in June of 1827, completely destroying the new canal system (Errázuriz, 1854: 71; Nazer, 1997: 9; Greve, 1944: 59, 65). The water shareholders (or the regador’s owners) argued that they did not have money to repair it because they “were tired of the frequent contributions that they had to disburse for support and repairs, then they became discouraged and refused to contribute

fully towards the [canal's] repairs" (Errázuriz, 1854: 71). Therefore, the canal manager Domingo Eyzaguirre requested a loan of \$20,000 pesos from the government to repair the canal (Íbidem). At the same time, the state, without resources to finance the expensive canal's repairs, decided to transfer all public rights over the canal to the irrigators who owned *regadores*. Then, these irrigators organized themselves into a new association: "on July 5, 1827, the owners of the regadores organized a new company: the Sociedad Canal San Carlos de Maipo. Since then, the owners of regadores became transformed into shareholders. To facilitate water rights transactions, the directory of the new Sociedad agreed, in November 1828, to open a record, so the regadores became easily negotiable" (Greve, 1944: 65).

This is the brief history of how the first water user organization was created in Chile. It is interesting to note that it was the government led by "Ramón Freire [who] transferred that public property to an association composed of private agents, the Sociedad del Canal del Maipo" (Villalobos et al, 1990: 33). I think this fact can be considered the first case of water privatization in Chile because there was a transfer of public resources to a private sector group mainly composed of large landowners. This transfer also established a notion of a water right (regador) as private property. Since then, water has been understood to be a private property, which was finally institutionalized in the 1855 Civil Code (Bauer, 2004). This legal body clearly expressed how the control over water was internally associated with social control. The significance of the Sociedad del Canal del Maipo created in 1827 is that with the government loan,

they finally repaired the canal, which was operational again by 1829, but now they were the owners of the canal.

Two decades later, in 1848, the boom of exports of cereals and other agricultural products to California began during the California Gold Rush. This provided a new impulse to irrigation and agricultural development along the central valley of the Maipo river basin that lasted until 1871, when the Californian people were finally producing their own food, and therefore such market closed to Chilean agricultural products (Bengoa, 1988: 167-171). As an illustration of these developments, the Sociedad Nacional de Agricultura (Agriculture National Society) was created in 1838, whose original name was *Sociedad Chilena de Agricultura y Colonización* (Chilean Society for Agriculture and Colonization)⁴⁸

During those decades, an interesting process began by which the landowners, by constructing canals in their haciendas, finally consolidated the private property of the land (and water) in Santiago and then in other regions. This was so because their predecessors—since the 16th century—had only made an “occupation of the land”, but the “agricultural appropriation of the land” was made by the landlords of the nineteenth century. This appropriation was made with canalization, that is, it implied putting water on the [dry] land” (Bengoa, 1988: 186). These landowner’s agricultural appropriation provoked a long but sustained process of land dispossession of independent campesinos

⁴⁸ <http://www.sna.cl/historia/>

who since the early 18th century were developing their own geographical projects as independent agrarian producers, outside but in close connection with the haciendas and large properties.

These independent campesinos, also known as *labradores* (Salazar, 1985), usually rented small plots from the landowners, and when they lived close to the main colonial cities like La Serena, Santiago, Valparaiso and Concepcion, they frequently requested small plots (both rented and requested as “Mercedes de tierras”) from the municipalities of these cities. Other poorer campesinos already practiced direct action by taking over small plots around or within the haciendas to produce crops for their subsistence (Salazar, 1985). During the first wheat and agricultural boom of the 18th century, the large landowners made commercial contracts with these independent campesinos, by which the former bought the wheat production of the latter, and then these landowners did business with Peru. At the same time, landowners recruited peones and other poor peasants without land to work for their haciendas, who later will represent the *inquilinos* or resident labor force working for the haciendas (Salazar, 1985: 40). It seems that the landowners, after they began to consistently construct their canals during the second half of the 19th century, did not want to repeat this “egalitarian” system of commerce with the *labradores* in this new agricultural/wheat boom created by California after 1848. They wanted these *labradores* and independent campesinos to work for them as a resident and semi-feudal labor force inside the haciendas. This trend to subjugate the independent campesinos aborted their historical geographical project as small rural entrepreneurs,

gradually transforming them into a dependent labor force. No doubt, the irrigation development of the 19th century definitively consolidated this historical process.

“Since approximately 1760, landowners or merchants began to dramatically increase the pressure on independent and semi-independent *labradores*. First, because of the general rise in the price of land, they significantly increased the [land] lease fees. Second, as merchants, they paid lower prices (using various stratagems) for wheat from *labradores*. Third, as lenders, landowners tripled their interest rates for cash advances, which resulted in them obtaining the campesinos’ wheat for a third of its value. Fourth, as collectors of taxes, they applied draconian collection methods, thereby amassing a large quantity of agricultural products at a very low cost. And fifthly, as *patrones* and in view of the irreversible insolvency of their tenants-producers, they demanded that [land] lease fees were paid through compulsory peonal service” (Salazar, 1985: 42)

In other words, the development of irrigation canals was the main material device towards consolidating political, economic, and juridical notions of land and water as private property. It also consolidated the landowner’s domination over inquilinos and, to a lesser extent, over peones working in the haciendas. Put in another way, since the mid-nineteen century, irrigation developments created a new configuration by which landowners finally consolidated their social power because “with the regularization of irrigation, the fundos from the area of the Maipo were structured and organized, which was going to be maintained for one hundred years” (Bengoa, 1990: 31), culminating with

the agrarian reform of 1964-1973 . The water works and water control through irrigation canals meant a growing social control over the labor force of labradores, inquilinos and peones. This general tendency began with the Canal San Carlos and then expanded throughout Santiago and the nation during and after the boom of wheat/agricultural exports to California (1848-1871) (Bengoa, 1988: 167-171).

In this respect, other important canals were constructed in the Maipo river basin. For instance, the Canal Las Mercedes was constructed to irrigate the haciendas Las Mercedes, Curacaví and Ibacache (Sandoval, 2003: 18), all of them located in the current communes of Curacavi and Maria Pinto. This canal is an excellent example of the relationship between water and the landowner's social power, because the owner of the hacienda Las Mercedes was Manuel Montt, President of Chile between 1851 y 1856. During his presidency, Montt and other landlords created the Las Mercedes canal project (a political project!), which was going to use water from the Mapocho river to irrigate the north-west region of Santiago. The canal was finally finished during the 1880s. This canal was also constructed because, similar to the eastern area of Santiago already irrigated by the Canal San Carlos, this western area also featured dry lands, a situation that worsened during the drought periods. This created the need for this construction, which unlike the early attempt to construct the Canal San Carlos, was an achievement for the engineers of those times because its construction implied crossing mountain chains with tunnels, a "technology that in those years gave us the title of world renowned innovators" (Sandoval, 2003: 18). The Las Mercedes canal construction is still depicted as a great achievement in irrigation development. The landlord's memories of its

construction are alive with respect for this process of domesticating water to irrigate fields. During my fieldwork I interviewed Benjamin⁴⁹, a large farmer and lawyer from Curacavi, who also recalled that President Montt made a joint business venture with the other landowners to construct the canal. In the process, another important Chilean politician, José Manuel Balmaceda, joined the organization. Balmaceda would also go on to be President of Chile (1886-1891), but it was before his presidency that the Las Mercedes canal was inaugurated, in 1884. According to Benjamin, “Curacaví is hydraulically very dry, it has very little water, only rainfall, but thanks to the vision of President Montt [...] and President Balmaceda, there was an organization dedicated [...] to bringing water from the Mapocho to the hacienda "Ibacache" and "Las Mercedes" located at the bottom of the Maria Pinto Valley ... It took 40 years to construct the channel ... When Balmaceda was president the canal was already inaugurated. In fact, the only legacy that Balmaceda left for his family was exactly 300 *cuadras* [450 hectares] of the fundo called "*Campo Lindo*," which is attached to Curacaví, which was the profit that he took from the entire enterprise”⁵⁰

One important thing to note is that the Canal Las Mercedes was envisioned to extract water from the Mapocho river, which during the second half on the 19th century was already polluted by the sewage and other pollutants coming from the growing industries and population of Santiago. At the beginning and for almost all of the 20th

⁴⁹ Interview conducted in Curacaví, December 2, 2014.

⁵⁰ After President Balmaceda was ousted by his political opponents during the Chilean civil war of 1891, he committed suicide in the Argentinean embassy of Santiago the same year.

century this was not an issue for irrigators, because farmers from Las Mercedes irrigated their crops with that sewage water from the Mapocho. It seems that this was acceptable according to the standards of the time. With a good sense of humor, Benjamin reflected that “in the canal Las Mercedes we used to receive the shit from Santiago”, literally expressing the metabolic relationships between the countryside and the city (cf. Foster, 2000). However, Benjamin mentioned that this “dirty” metabolism was questioned during the 1990s, when they received pressure from their global markets (Europe, USA, Japan) to irrigate their crops (fruits, vegetables, etc.) with treated water. In other words, they were prompted by buyers to produce a “clean” metabolism.

The government of that time, Eduardo Frei Ruiz-Tagle (1994-2000), the son of Eduardo Frei Montalva, argued that they did not have the money to invest in a wastewater treatment plant for the Mapocho. Therefore, in 1997 the Frei government privatized the public sanitary companies in order to accomplish this goal. The main privatized companies were ESVAL (*Empresa Sanitaria de Valparaíso*) and EMOS (*Empresa Metropolitana de Obras Sanitarias*). The latter was bought by the transnational Aguas Andinas (Spain). This company constructed the main wastewater treatment plants to clean the polluted water from the Mapocho: El Trebol and La Farfana, which have been operational since 2001 and 2003 respectively (Galvez, 2003). This infrastructure allowed farmers like Benjamin to continue irrigating with the water from the Mapocho and trading their crops within their global markets. “We now receive the shit filtered”.

Another source of canal development in Santiago during the second half of the 19th century was through mining capital reinvested in irrigation and agricultural lands in Santiago, particularly in vineyards because “it was profitable” (Bengoa, 1990: 24). This was the case of the Pirque canal, which was constructed during the 1850s by the initiative of an individual who accumulated his wealth in the nitrate mines of the north. According to Ezequiel, electric engineer and current manager of the *Asociación de Canalistas de Pirque*⁵¹, this capitalist was “Mr. Ramon Subercaseaux Mercado (this street [indicating a nearby street] bears his name, and the other street is Mrs. Virginia Subercaseaux, his daughter) [He was] a man enriched by the mines of the North, part of Copiapo, may have been silver mines, I think [...] Pirque had no water, it was only watered by a small river called the Clarillo. But during those times the river came as it comes now, “boxed”. Back then there was no way to lift the water to these highlands... then this man, very intelligently, (he must have been very clever) requested “mercedes de agua” [water rights] from the Governor of Rancagua ...they gave him water rights to build his water intake [“bocatoma”] ... so this man made a bocatoma on the south bank of the canal San Carlos, approximately 1500m upstream of the existing canal San Carlos’ water intake... then mister Subercaseaux built that channel...It is said that he was associated with the devil, who helped him to build the canal”.

The presence of the devil in the Ezequiel’s discourse can be interpreted as representing how difficult it was to construct the Pirque canal because, like the San

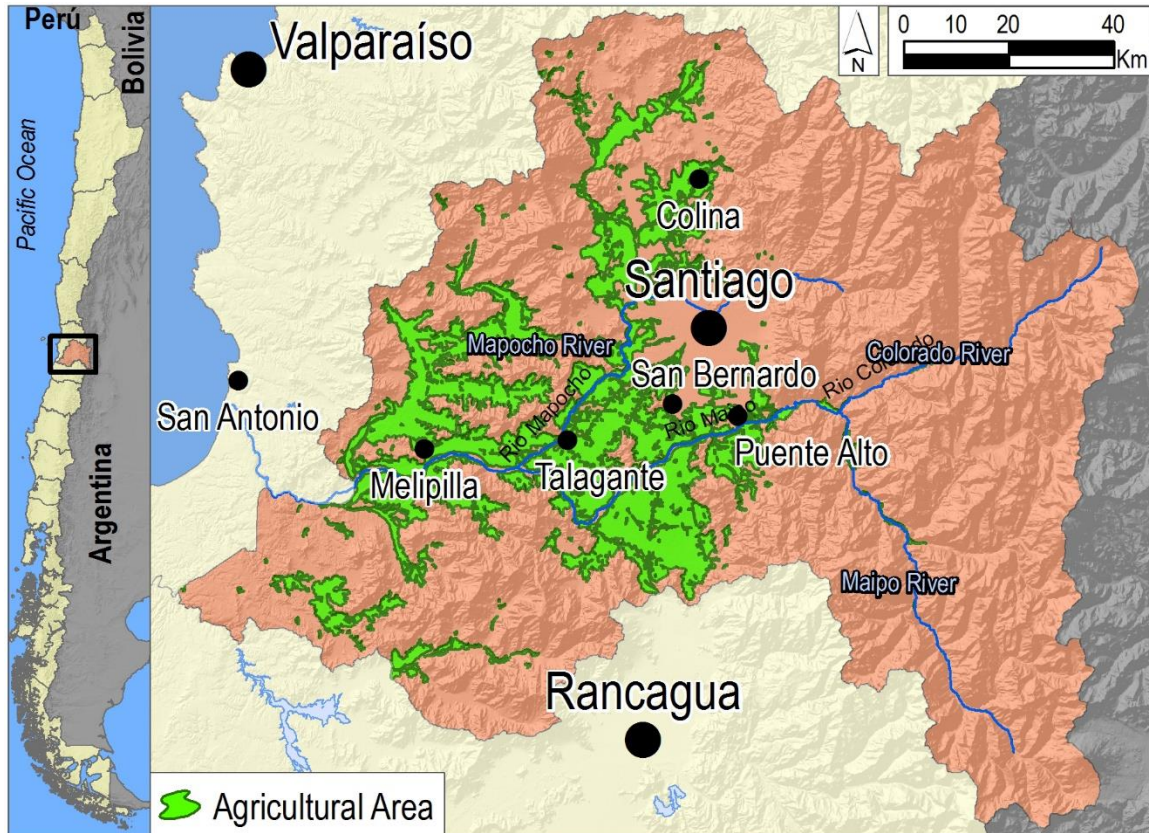
⁵¹ Interview conducted in Pirque, November 12, 2014

Carlos experience showed, the engineers had to deal with many geographical difficulties, especially hard rocks for which they had to use large amounts of dynamite. This quote also reflects the general pattern of constructing a canal during the nineteenth century: buy the land (when the investments came outside the traditional landlords' families, in this case mining rents), then request the water rights from the governor, construct the canal, and then begin to sell the "regadores". Unlike the traditional landowners, these capitalists enriched by northern minerals were looking for more than profitable investments. They were actually looking for access to the political power circles controlled by the landlords of Santiago. Investing in irrigation for agricultural activities, in this case the vineyards of the developing wine industry⁵² was a means for these mining capitalists to penetrate into the Chilean aristocracy, by which they also penetrated the power elite controlling the state apparatus (Bengoa, 1990: 53). In this case, water and political power were also related through canal developments.

Thus, along with San Carlos, Las Mercedes and Pirque, by the end of the nineteenth century "the Maipo valley was completely irrigated, with many canals going out from the southern and northern riversides" (Bengoa, 1990: 25). Figure 4.3 shows current agricultural areas in the Maipo river basin, which are irrigated both by surface and groundwater.

⁵² Which until today is perhaps the most important in the country, for instance, through Vina Concha y Toro and others still located in Pirque

Figure 4.3 Agricultural/Irrigated lands in the Maipo river basin, Santiago Region



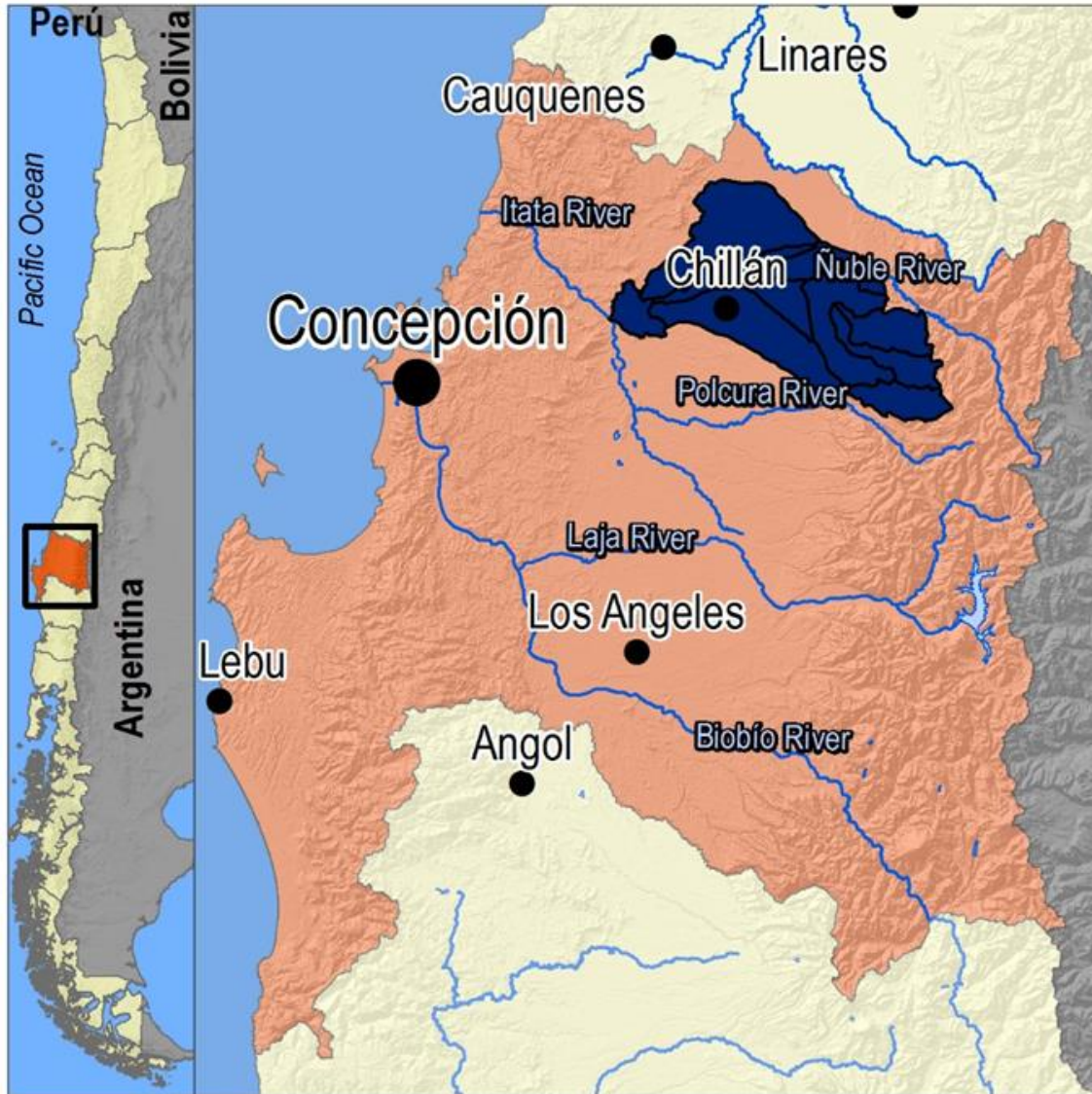
Source: Center for Environmental Sciences EULA-Chile

1.2 Irrigation development and water dreams in the Itata river basin

The Ñuble is a sub-basin of the Itata river basin, whose hydrosocial situation I reviewed in part in chapter 3. It is located in the province of Ñuble, which is in the northern part of the Biobio Region. According to the Agricultural Census of 2007, the Province of Ñuble has around 87,295 hectares of irrigated lands (INE, 2007; Torres et al, 2015: 117) located mainly in the central valley of the Nuble sub-basin (blue area in the Figure 4.4). The origin of agriculture and livestock in this northern area of the Biobio

region also dates back to colonial times like in Santiago, but in Nuble the situation is historically different than in the capital.

Figure 4.4 Irrigated lands of the Nuble river basin, Biobio region



Source: Center for Environmental Sciences EULA-Chile

As noted previously, the Biobio river was the historical frontier between the Spaniards and the Mapuche during colonial times. In simple terms, the Spanish army was not able to conquer the Mapuche. For this reason, during the 18th century, the Spaniards

recognized the area south of the Biobio river as the territory of the Mapuche. This territory was also recognized by O'Higgins and the revolutionaries after the war for independence. However, this recognition ended when the Chilean army assaulted and appropriated the Mapuche lands in 1881, initiating the geographical project represented by forestry development (cf. Klubock, 2014; Torres et al, 2016; chapter 3).

For these reasons, the city of Concepcion, which is located on the north side of the Biobio river, was the real frontier between the Spaniards and the Mapuche. During colonial days, Concepcion and the area of Ñuble were actually a military fortification, in which lived the Spanish soldiers of the permanent army financed directly by Spain. Frequently, the governor of Chile (on behalf of the Spanish king) allocated lands (Mercedes de tierras) to these officials and soldiers for their services to the empire. These Mercedes de tierra were gradually adapted for agricultural activities, and these are the origins of agricultural development in the area of Ñuble river basin. At the beginning, the Spanish soldiers produced crops such as wheat and then grapes, from which they produced wines and schnapps, which were frequently exchanged for animals and blankets with the Mapuche in frontier cities like Chillan, Concepcion and Los Angeles (Bengoa, 1990: 142; Torres, 2013: 292-293). Precisely because of the Spanish origin of the people living between the Biobio and Ñuble rivers, during the war for independence they were loyal to Spain. This is one of the main reasons why after the war finished, the area continued to have constant armed conflicts as a consequence of both the war and the “war of resources” that followed it. As noted by the historian Gabriel Salazar,

“This area proved to be the main battlefield of the war, not only of independence but of the peasant wars that followed. Throughout the period of 1810-1832, regular and irregular military conflicts broke out there. No other region of the country experienced a similar situation. The main result was the temporary but widespread uprooting of campesinos that had settled there before 1810. Large masses of poor people ("clouds of beggars") had to move from one point to another, looking for land, food and stability. This forced to the city's public officials to *mercedear* [allocate Mercedes de tierra] or lease thousands of sites and plots to poor people, and to repopulate numerous peasant villages. The result was that by 1850, a dense strata of small landowners were crowded around the towns and cities. This constituted, perhaps, the highest concentration of this type of farmers nationwide”
(Salazar, 1985: 65)

The quote is important because it highlights the differences between Ñuble and Santiago. Unlike Santiago, in which the large haciendas dominated, Ñuble was settled mainly by peasants and small farmers. Also, unlike Santiago, in which the private property of land was very clear, this frontier area of Ñuble was a sort of “no man’s land”, in which people had to defend their properties from attacks of rival groups by themselves. After the stabilization of the peasants and small producers in the 1850s, the governors began new waves of allocations of Mercedes de tierra. Then, during the second half of the 19th century, many of these campesinos and small-farmers who had been awarded land also requested water (Mercedes de agua) to adapt to the growing demand from California.

For instance, they “exported 227,000 quintals [of wheat and other products] through the Tomé port in 1864, which reached 590,000 quintals in 1874” (Bengoa, 1990: 143). But after the California market closed during the 1870s, there was a crisis for these small producers, and according to Bengoa, there was a tendency to concentrate land in the area. However, even so, this land concentration never reached the levels of concentration observed in Santiago. For instance, by 1930 in the Ñuble area there were “almost 10,000 properties between 5 and 50 hectares and 1,670 between 50 and 200” (Bengoa, 1990: 147).

All these processes encouraged canal irrigation development in the Ñuble river basin. Unfortunately, the details on specific canal construction for this area are not well documented like in Santiago, which also reflects the power of Santiago in comparison to its counterpart provinces like Ñuble. In effect, it highlights the differences between aristocratic landowners from Santiago living on haciendas and possessing well defined private property rights and the campesinos and their modest farm operations in Ñuble. While the landowners from Santiago dedicated their time to politics and the state apparatus, the campesinos from Ñuble lived on their farms and constituted perhaps the best example of an “agrarian middle class” in the country, a condition that they maintained during much of the twenty century (Bengoa, 1990: 150).

Nonetheless, Maipo and Ñuble share some climatic conditions like aridity and the marked seasonal rainfall concentrated between April and September, which obligates the creation of different forms of coordination between irrigators to efficiently use the water

during the irrigation season (October-February). Like Santiago, the Ñuble river basin also depends principally on the seasonal pattern of precipitation accumulated as snow in the mountain range of the Andes cordillera including the area of “Termas de Chillan”, which allows the Ñuble river to have enough snow runoff during the summer, the period that coincides with the season of irrigation in the area. January and February are critical months because the river flows are considerably reduced because at that point snowmelt no longer remains to feed the river. This causes a reduction in the physical flow of the river Ñuble, and thus water shortages for irrigation canals in the basin. And while farmers organize each summer in various ways to cope with the water shortage, conflicts nevertheless emerge, as they have historically (Torres, 2013). For this reason, since at least the 1920s, the Punilla reservoir project in the Andean mountains of Chillan has been proposed. This reservoir has been anticipated for decades—as the Canal San Carlos would have been in the 18th century—a sort of ‘water dream’ for the almost five thousand irrigators of this river basin. However, this reservoir is still unrealized in 2016 because it has been approved by the government but its future development is uncertain (see chapter 6).

2. Keynesian hydro-modernities (1888-1963)

The second long period discussed in this chapter is between 1888 and 1963. During this period, two main events occurred: the urbanization of water (and agricultural lands) in Santiago,⁵³ and the creation of water user organizations following the *Ley de*

⁵³ I won’t review the urbanization in Ñuble, because, in terms of its significance to the development of water policies and scale, it is more relevant to analyze the case of Santiago. However, this does not mean

Canalistas (Canal Users Law) enacted in 1908. I will briefly review the first point, in order to emphasize the process of legalizing water user organizations after 1908, which is relevant because it consolidated the notion of water as private property and impacted future developments in the social organization of irrigators. I call this stage Keynesian because the water works associated with the urbanization of water in Santiago were conducted mainly by the state and municipalities, that is, with public resources but with minor private investments as well. However, the development of water user organizations was led solely by the private irrigators.

Hydro-Keynesianism, potable water, and the canalization of Mapocho river as metabolic urbanization in Santiago

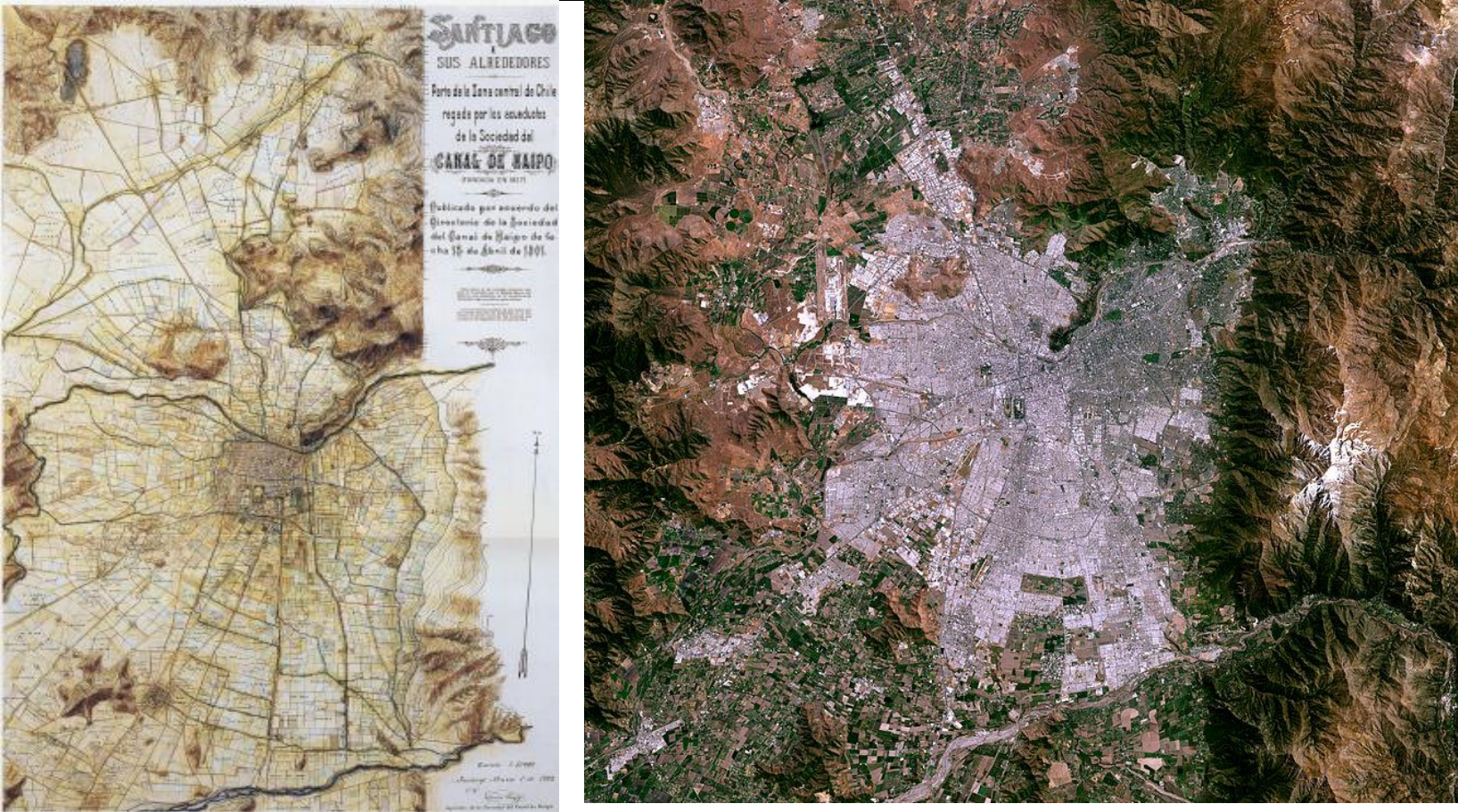
It is not an exaggeration to say that the Canal San Carlos introduced one of the first modern acts of domesticating nature in Santiago, deviating portions of the Maipo water for irrigating areas that were infertile in the past, and at the same time, consolidating the social power of water shareholders within the society of landlords and state politics. However, after almost two centuries since its construction, the original lands irrigated by the Canal San Carlos have been almost completely urbanized (Figure 4.5).

that urbanization of water is not important in Ñuble, but for space, this specific research will have to be done in the future.

Figure 4.5: Urbanization of irrigated agricultural lands in Santiago, 1907-2014

4.4a. Santiago in 1907

4.4b. Santiago in 2014



Sources: Sociedad del Canal del Maipo, 1997, p. 107; and NASA, 2014

This means that the Canal San Carlos gradually lost its value as an irrigation canal during the twenty century. For instance, in 1920 the canal irrigated 90,000 hectares, which at the end of the 1990s were reduced to 20,000 ha. (Sociedad Canal del Maipo, 1997:11). But in the process, the canal San Carlos began to take on new functions, such as hydropower generation (see chapter 6), and in light of the growing urbanization of the western area of Santiago, the canal also became transformed into the main aqueduct for the containment of rainfall water coming from the foothills of the Andes and flowing in an east-west direction to the city. As stated by a CEO of the society, “the Canal San Carlos...has become critical as the only channel for collecting rainwater in eastern Santiago” (Sociedad Canal del Maipo, 1997: 11).

In effect, during the boom of canal development in the nineteenth century, Santiago city experienced an increase in population and therefore, the urban radius was gradually expanded, gradually affecting the lands irrigated by the Canal San Carlos (Table 4.1).

Table 4.1. Development of Santiago: population and surface

Year	Number of Inhabitants	Area of Gran Santiago (ha)
1810 ⁽¹⁾	30,000	
1854 ⁽²⁾	131,117	
1865 ⁽²⁾	171,720	
1885 ⁽²⁾	236,870	
1895 ⁽²⁾	312,467	
1907 ⁽²⁾	403,775	
1940 ⁽¹⁾	1,058,456	11,348 ⁽³⁾
1952 ⁽¹⁾	1,509,169	15,570 ⁽³⁾
1960 ⁽¹⁾	2,133,252	22,880 ⁽³⁾
1970 ⁽¹⁾	2,871,060	29,480 ⁽³⁾
1982 ⁽¹⁾	3,937,277	38,364 ⁽³⁾
1992 ⁽¹⁾	4,676,174	46,179 ⁽³⁾
2002 ⁽³⁾	5,822,316	
2014 ⁽⁴⁾	7,228,600	60,000 ⁽⁵⁾

Sources: ⁽¹⁾ Rodríguez, 1993: 98-99; ⁽²⁾ Bengoa, 1990: 23; ⁽³⁾ Ferrando, 2008: 3; ⁽⁴⁾ INE, 2014: 102; ⁽⁵⁾ DGA, 2011:3

As the majority of population was concentrated in the historical city around the Mapocho river, there were many sanitary problems associated with it. In effect, many marginal groups of campesinos and peones immigrants began to occupy (frequently illegally) different areas around the city, creating sanitary problems. This situation alarmed the authorities, who since 1872 had engaged “urban reforms” to “beautify” the city (Oyarzun et al, 2005: 72). The main public policy adopted to achieve this goal was the canalization of the Mapocho river (1888), which was followed by the construction of a “modern system of evacuation of both rainfall and sewage waters” (Oyarzun et al, 2005: 72). The president Jose Manuel Balmaceda, in his annual account to the parliament in 1888, said the following:

“There are three methods that will directly affect the sanitation for our urban populations. The first is the provision of potable water to all cities that do not have it yet. The second will be the construction of sewage systems, which conveniently serve the needs of populations. Third, the regulation of hygienic conditions, and that must be met in urban constructions, mainly in the houses intended for workers” (quoted by Castillo, 2014, p. 135)⁵⁴.

⁵⁴ My translation. Original in Spanish: “Hay tres medios que influirán directamente en el saneamiento de nuestras poblaciones urbanas. La primera consiste en la dotacion de agua potable a todas las ciudades que no lo tienen; el Segundo sera la construccion de desagues, que sirvan convenientemente a las necesidades de las poblaciones, tercero, la reglamentacion de las condiciones higienicas, y que deben cumplirse en las construcciones urbanas y muy principalmente en las destinadas a habitaciones de obreros”

The “hygienist” doctrine emerged from this new hydrosocial configuration around the canalization of the Mapocho river and the construction of the modern networks of *alcantarillado* and *agua potable* for the city (Oyarzun et al, 2005; Castillo 2014). The growing city demanded minimum conditions for living, and water was envisioned in different ways (potable, sewage, home designs, etc.) as the key element in this new era of Keynesian hydro-modernity (e.g. Kaika, 2005). To be sure, during the last decades of the 19th century, the marginal urban and peri-urban inhabitants of Santiago and other cities suffered epidemics of cholera, tuberculosis, and typhus, and child mortality was 69.8% by 1890, with the marginal groups of campesinos and peones living around the Mapocho and the south periphery of Santiago being the worst affected (Castillo, 2014: 135). This situation created the need for new water infrastructures to “sanitize” the city⁵⁵.

This phase of Keynesian hydro-modernization undertaken by the Chilean state to construct networks of urban water in Santiago, created an irreversible differentiation between the water for irrigation and the water for urban uses, which until then had only been one system (Piwonka, 1999). This differentiation was also a process of conflict over water, mainly expressed around the canalization of the Mapocho river, which in Santiago, was transformed into a canal of almost 3 kilometers (Castillo, 2014). Many landowners who owned water shares or *regadores* from the Mapocho opposed this canalization because they gradually lost their *bocatomas* located in the river area in which the Mapocho was channeled.

⁵⁵ The sanitary city was a common movement among urban planners in late 19th and early 20th century. See Melosi (2000)

The same process occurred with irrigators from the Maipo river, whose regadores were gradually expropriated by the state in order to redistribute part of the Maipo water for urban uses, mainly domestic and industrial (Castillo, 2014: 149-182). As the main water shareholder and user organization in the Maipo river, the Sociedad del Canal del Maipo was the key actor in this conflict with the state for these growing “water use changes” from irrigation to urban purposes. Thus, at the beginning of the twenty century, the relationship between the Sociedad del Canal del Maipo and the state was problematic because “as the Mapocho water was insufficient to serve the city due growing urban expansion, in 1910 the Intendencia [regional government] decreed the extraction of 3 meters³ per second from the Maipo river to be conducted through the Canal San Carlos in order to function as a sewage service of Santiago. This action triggered a lawsuit from the Sociedad against the state, arguing that this decision diminished their water rights equivalent to one hundred regadores” (Castillo, 2014: 162).

These controversies are important because they highlight antecedents to how, from the beginning of the twenty century, the state already prioritized uses for the human consumption and “public” wellbeing to the detriment of private uses of water. One hundred years later, drinking water for human populations is also one of the main defenses made use of by the Bachelet government to implement the 2014 water reforms (see chapter 5). In addition, the process of “water use changes” from irrigation to urban consumption have continued until today. In the light of the growing Santiago population, many agricultural lands are being transformed into condominiums and small plots are converted for residential purposes (*parcelas de agrado*), gradually eliminating the

irrigated agricultural activities from peri-urban communes such as Pirque, Til Til, and Colina.

For instance, in Pirque, Ezequiel said that “the haciendas have been divided into *hijuelas*, the *hijuelas* into plots, and the plots into *parcelas de agrado* [pleasure or residential plots] of 5,000 meters square, which has been removing agricultural land to turn it into housing [...] People who have inherited land do not like agriculture, and they prefer to sell the land and to get cash of course. And they sell plots of 5,000 meters with the water rights included”.

In the northern area of Santiago, the situation is much more problematic because the land/water use changes are not only oriented to residency but also for mining and expanding industries, which are putting increasing pressure on the aquifers. For the authorities of the regional government this is problematic because they do not have complete control over these land and water use changes, which nevertheless affect them. As expressed by Fabiola, a public official from the Ministry of Agriculture⁵⁶, the Santiago region

“Has serious conflicts because mining, hydroelectric [Alto Maipo] and real estate projects are removing lands from the agricultural sector... The mayors say ‘we have a number of people who don’t have anywhere to live and we need a real estate project’ so the mayors are part of the problem. You tell them ‘but these are lands exclusively for agricultural uses, they have some of the best soil in the region’, because in fact, the metropolitan area has the best soil of Chile. But the mayors approve the projects. Why? Because they mean

⁵⁶ Interview conducted in Santiago of Chile, November 25 of 2014

profit for the municipalities [...] The most common projects today are industrial projects. For example, in Lampa and Colina—which now are practically non-rural communes—there are agribusiness plant projects or storage warehouses. Also, in the Til-Til area is the [mining project] CODELCO Andina 244, which is going to be a *tranque de relave* [tailings dam] that threatens the groundwater because there already is a small *tranque de relave* and there is a small leak. They want to make it three times larger. Obviously, in order for this to work they will have to extract water from the basin, then that can dry the whole northern part of the region”

Since the end of the 19th century, these controversies around the transformation from irrigated agriculture to urban uses have been a stimulus for the state authorities and irrigators to create new policies, crystallized in the Canal Users Law or *Ley de Canalistas* of 1908. Today, the same processes of urbanization of water—in the context of growing pressures coming from economic development and drought—are creating a similar configuration of “water problems” in which the state is once again assuming a central role in coping with the water crisis in the region. These are among the main arguments of the Bachelet government to justify the water reform of 2014 (Delegacion Presidencial para los Recursos Hidricos, 2015). However, before turning to these issues, I review effects of the 1908 Canal Users Law.

The Ley de Canalistas of 1908: a framework to legalize the water user organizations as water institutions

This law was the consequence of the increasing participation of the state in water system modernizing, including irrigation. The law created the “Inspeccion General de

Regadio” (Irrigation Department) which was dependent on the Public Works Direction (Rios, 1936; Arumi et al, 2014: 665), the latter created during the government of Balmaceda. This law was necessary because, as the examples of Mapocho and Maipo showed above, at the beginning of the 20th century the state was expropriating water from rivers, but there were no rules for governing the water in canals. In this way, the Ley de Canalistas of 1908 promoted the creation of water user organizations, a norm also reaffirmed in the first Water Code of 1951 (Arumi et al, 2014: 665) and maintained in the 1967 and 1981 Water Codes. Thus, from 1908 onwards the process of the legal constitution of irrigators that already were sharing water in their respective canals and sub-canals began. As I mentioned in chapter one, these organizations are mainly *Asociaciones de Canalistas* (Canal Users Organizations), *Comunidades de Agua* (Water Communities) and *Juntas de Vigilancia* (Vigilance Committees). Charts 4.1 and 4.2 show the historical process of legal constitution of the first two types’ water user organizations in the Maipo and Nuble river basins, respectively. Chart 4.1 shows, for instance, that in Santiago, the legal constitution began immediately after the law was enacted, while chart 4.2 shows that in Nuble the process began during the 1920s. Chart 4.1 also shows that although the Sociedad del Canal de Maipo has been affected by the urbanization of agricultural lands since the late nineteenth century, by 2009 they still owned an important proportion of water rights (water shares) in the Maipo river basin. As Lucas expressed it, they are still “powerful actors” influencing irrigation development in the basin. The charts 4.1 and 4.2 also highlight that the legal constitution of water user organizations has been a process that has continued during all of the twentieth century and the twenty-first century as well. However, these organizations are only the legally constituted ones. In

both river basins exist many other organization that are not yet legally constituted, but that function as informal organizations (*organizaciones de hecho*), which in any case own water shares and also frequently participate in the annual meeting of the respective Juntas de Vigilancia.

Chart 4.1: Selected water user organizations of the Maipo river basin according to main historical-geographical and hydrosocial characteristics

Organization name	Year of legal constitution	N° water shares	N° users	Commune(s)
Asociación de Canalistas Unidos de Buin	1909	1052	1,001	Buin; Paine
Asociación de Canalistas Canal Puangue	1909	150	300	Melipilla
Comunidad de Aguas Tanguito	1909	34,9	101	Calera de Tango
Asociación de Canalistas del Maipo	1910	1614	2,800	Puente Alto; San Bernardo; Buin; Calera de Tango; Maipú; Padre Hurtado
Asociación de Canalistas Canal Huidobro	1911	640,9	97	Buin; Paine
Asociación de Canalistas Canal de Pirque	1912	635	550	Pirque
Asociación de Canalistas Las Mercedes	1922	400		Maipú; Curacaví; Maria Pinto
Comunidad de Aguas San Benjamín de Pirque	1939	18	41	Pirque
Asociación de Canalistas El Romeral	1940	505,7	45	San Bernardo
Comunidad de Aguas Rinconada Huelquén	1941	9,5	20	Paine
Asociación de Canalistas Lo Herrera	1943	906,6	112	San Bernardo
Asociación de Canalistas Santa Ana de Chena	1946		96	Maipú
Comunidad de Aguas Estrella de Huelquén	1972	11,3	36	Paine
Asociación de Canalistas Río Colina	1982	195	87	Colina
Comunidad de Aguas Flora Infante	1987	707	40	Maria Pinto (Pirque?)
Comunidad de Aguas El Principal	1989	18,8	164	Pirque
Comunidad de Aguas Colonia de Paine	1989	34,9	120	Paine
Comunidad de Aguas Clarillo Lo Arcaya	1992	50	152	Pirque
Comunidad de Aguas Huechún	1992	150	289	Melipilla
Comunidad de Aguas Ramal Villaseca	1996	5,9	23	Buin
Asociación de Canalistas Canal Culiprán	1997	220	700	Melipilla
Comunidad de Aguas Chorombo	1997	97,6	65	Maria Pinto
Comunidad de Aguas Alto La Esperanza	2001	42	137	Padre Hurtado
Comunidad de Aguas Manantiales	2008	25,2	36	Melipilla
Comunidad de Aguas El Tranque	2008	19,6	20	Melipilla

Sources: elaborated with data of Comisión Nacional de Riego (2009a, 2009b), and author's fieldwork

Chart 4.2: Selected water user organizations of the Itata river basin (Ñuble sub-basin) according to historical-geographical and hydrosocial variables

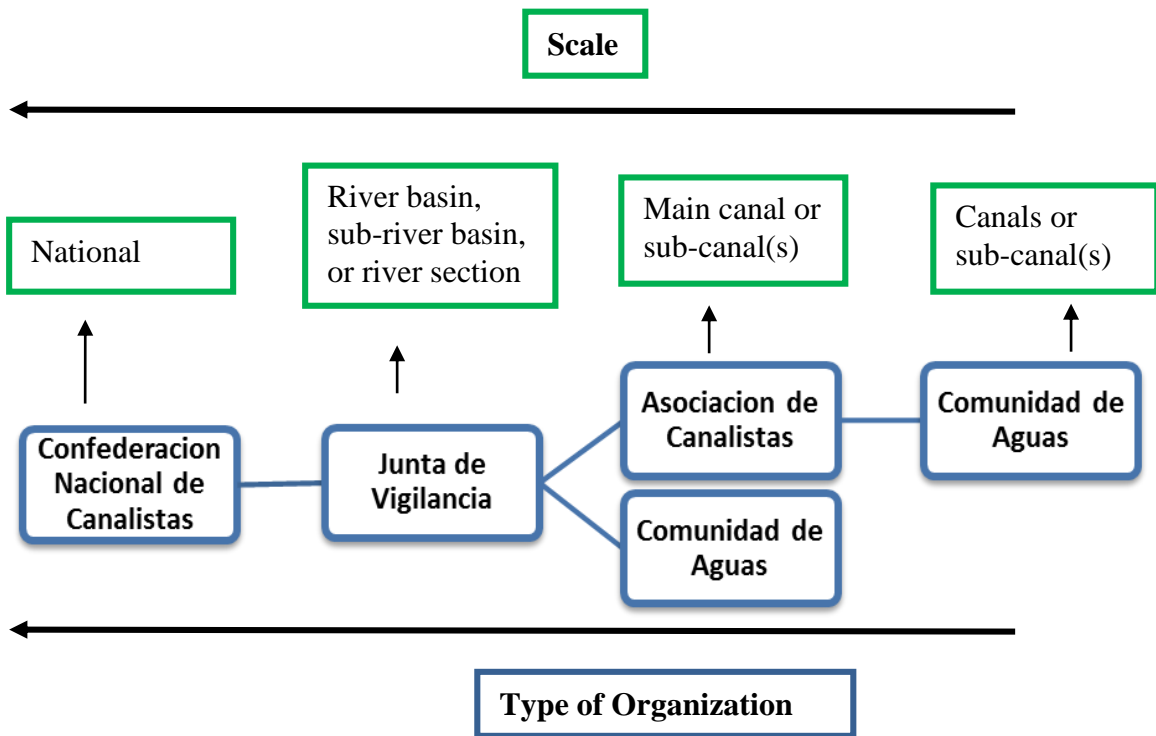
Organization name	Year of legal constitution	N° water shares	N° users	Commune(s)
Asociación de Canalistas Green y Maira	1923	679.7	262	
Asociación de Canalistas Juan Francisco Rivas	1927	4470	850	
Asociación de Canalistas Santa Sara	1941	633.1	41	
Asociación de Canalistas Dadinco	1942	1,562.7	81	
Asociación de Canalistas Lurin	1944	238.7	114	
Comunidad de Aguas Canal Gaona Perales y Ranchillo	1958	700	112	
Comunidad de Aguas Canal Arrau	1960	511.9	78	
Comunidad de Aguas Canal San Agustín Changaral	1969	1,091.3	232	
Comunidad de Aguas Rinconada de Cato	1969	200	32	
Comunidad de Aguas Canal Moreira	1970	765	50	
Comunidad de Aguas Canal Municipal	1975	970.1	243	
Comunidad de Aguas Canal El Alazan	1978	300	4	
Asociación de Canalistas Chacayal	1984	900	44	
Comunidad de Aguas Canal Quinquhua	1985	60	4	
Comunidad de Aguas Canal San Pedro	1992	165.8	200	
Comunidad de Aguas Santa Isabel-Genética	1995	100.9	39	
Comunidad de Aguas Canal Cocharcas	1995	245.2	16	
Comunidad de Aguas El Peñon	1995	203	80	
Comunidad de Aguas Canal Quilelto	1995	128.8	15	
Comunidad de Aguas Canal Monte Blanco-López (El Bajo)	1995	100	7	
Comunidad de Aguas Canal Capilla Navarro	1995	160	7	
Comunidad de Aguas Canal Bellavista	1995	250	2	
Comunidad de Aguas Canal Collico	1997	710	200	
Comunidad de Aguas Monte Blanco-Santa Marta	1997	156	6	
Comunidad de Aguas Canal San José Sur	2006	300	2	

Sources: elaborated with data of Torres (2010), and author's fieldwork

From the perspective of water governance, this structure created a system for managing water for irrigation at different socio-spatial scales. Figure 4.6 shows how these organizations participate in the complex networks for managing the water, from the canal up to the river basin scales. At the micro-level, the Comunidades de Agua are the organizations that distribute the water among their farmers and peasants on the scale of the main canal or sub-canal, the latter also known as “ramales” by irrigators. At an

intermediate scale, the Asociaciones de Canalistas are frequently the entities that manage and organize their irrigators at the level of the main canal, distributing water to the different sub-canals that depend on the main canal (canal matriz). Many Comunidades de Agua are included within the Asociaciones de Canalistas, but not the other way around. Next, both Comunidades de Agua and the Asociaciones de Canalistas participate in the Junta de Vigilancia, which allocates the water from the (natural) river to their respective (artificial) irrigation canals.

Figure 4.6 Scalar configuration of water management through Water User Organizations in Chile



Source: own elaboration

It is important to note that the Nuble river basin has only one Junta de Vigilancia for the whole river. It was legally established in 1959, although they had been organizing

the Junta since 1925⁵⁷. In contrast, the Maipo river basin has more than one Junta de Vigilancia, which reflects the hydrological complexities of the basin (several sub-basins: Mapocho, Colina, Puangue, Colina, Clarillo) but also the high density of irrigation developed on it.

Finally, in 1986 these water user organizations from Maipo and Nuble, along with other organizations from the nation including the Sociedad Nacional de Agricultura, created a national irrigators entity, the *Confederacion de Canalistas de Chile* (Canal Users Confederation of Chile), increasing their political influence as irrigators from the river basin to the national scale.

Overall, during this long period of Keynesian hydro-modernization, water user organizations were developed independently but also were closely related to state water resource policies. As a consequence, irrigators' organizations were consolidated as a key institution for managing water at the river basin scale. The period of the agrarian reform was going to be a rupture, but also a continuity, for these developments.

⁵⁷ <http://www.rionuble.cl/historia.html>

3. Reformist and Socialist hydro-modernities (1964-1980): Agrarian class struggles and the campesino movement as a geographical project

During the agrarian reform, many of the water shares for irrigation owned by the landowners and their haciendas were expropriated and redistributed to campesinos and inquilinos living and working within the fundos. This was the main rupture from the previous stage. However, a key continuity was that the new water shareholders were subjected to the already existing rules for water user organizations: they had to organize themselves or join an already existing Comunidad de Aguas or Asociacion de Canalistas within their canal or sub-canal in order to distribute the water among irrigators according to their water shares. The difference was that now, for the second time in their journey through the Chilean history, the campesinos and peones obtained what seemed to be a definitive independence from their landlords (*patrones*) by receiving land and water from CORA and organizing themselves into rural unions, asentamientos and cooperativas as part of agrarian reform (1964-1973). Although they had many difficulties, these new forms of campesino organizations continued during the first decade of Pinochet's dictatorship (1973-1983). After this period, the counter-agrarian reform of Pinochet began and many lands were repossessed by its the previous owners (see chapter 3).

In the long term overview, the campesino uprisings throughout the twentieth century until 1973 (Loveman, 1976; Klubock, 2014) can be seen as their final assault on state power, achieving their rights to the land and water and giving continuity to their old geographical project as an independent labradores' movement (Salazar, 1985, 2012). In other words, the process can be viewed as the instauration of the campesino movement's

class power, a social network composed of inquilinos, peones, and independent and semi-dependent labradores.

In turn, the response to this process of campesino's struggles from the military and civil elites during the dictatorship can be seen as the restoration of the old class power structure of terratenientes. I describe these processes through the experience of large farmers and campesinos from the Maipo and Nuble river basins, in order to highlight some problems that are internally related with the current disputes over property rights in the contested frontiers between the private and public domains over water.

Liberation ecologies and the instauration of the campesino's class power

During the 1960s, Jeronimo was an inquilino for the hacienda Las Mercedes, located in the middle of the Maipo river basin, in the commune of Isla de Maipo⁵⁸. In 1965, this fundo of 1019 hectares (around 200 of which were irrigated) was expropriated by CORA. The life story of Jeronimo illustrates the campesinos' liberation from the semi-feudal based labor system that existed within the haciendas before agrarian reform, which became transformed into a collective of productive relationships within the asentamientos and cooperatives established by CORA. These new productive social relations among ex inquilinos and campesinos, in which they now managed their own means of production (land, water...), can be seen as the continuity of the old independent

⁵⁸ Interview conducted in Isla de Maipo, November 21st, 2014. [It seems to be that this is a different hacienda than the one mentioned above. I will have to check this information]

labradores geographical project. The transition was not easy. Jeronimo still recalls the oppressive days within the haciendas

“In the past, the fundo required inquilinos *obligados* [obligated] to qualify for a home...if [the owner of the estate] provided a house to my dad, my dad had to offer three more inquilinos, one of them *obligado* to qualify for the house [and small plot] ... *obligado* meant that you were working Saturday, Sunday, any day that the [landlord] called. So *obligado* was to mean forced as a slave...they were paid of course, but there were savage abuses...we were truly *perraje* [mistreated dogs]"

Unlike other haciendas in which many landlords resisted the expropriation, the case of Las Mercedes was the opposite, because according to Jeronimo, CORA paid a very good price for the property in 1965, which helped it to have a peaceful transition from hacienda to asentamiento CORA. The new asentamiento was composed of 65 families of campesinos who lived there during that period.

Once liberated from the landlord and receiving technical support from government's professionals (land measurements, fertilizers, etc.), these ex inquilinos, who had worked almost all their lives under a dependent or semi-dependent system , were now faced with the (hard) tasks of managing their own rural enterprise. They continued producing grapes and wine as they did for the old landholder. They also continued using the water rights already owned by the estate: “the fundo came with all its

water rights over the Maipo river, which was the main source of irrigation here in Las Mercedes”.

According to Jeronimo, they continued using the ancient and most common irrigation technique, the so called “*riego por manteo*”, also known as “*riego tendido*”, or “*riego botado*”, which has been practiced by the haciendas since the 19th century, in which water coming from the canal completely flooded the crops, in this case the vineyards⁵⁹. This rudimentary technique was a waste of water, which eventually was abandoned due to water shortages. Agrarian reform coincided with the drought that affected Chile, from Atacama to the Biobio region, between 1967 and 1970 (Schneider et al, 1975). In response, in addition to the water from their irrigations canals, Jeronimo and the other campesinos producing wine in Las Mercedes began to rely on wells to irrigate vineyards. Jeronimo remembers clearly that “during the 1960s onwards the droughts began and as an asentamiento we prepared for it, so then we constructed a deep well of 90 or 100 meters”

Similar processes were experienced by the peasant communities from the hacienda Dadinco in the commune of San Nicolas, Biobio region. Aurelio⁶⁰ lived there with his family. His father was an inquilino for the hacienda, and when the fundo was distributed among the peasants, they did not participate in the allocation of plots because “my dad was very proud”. Instead, Aurelio’s father preferred to buy a plot or *parcela*

⁵⁹ “The hacienda, along with constructing the irrigation systems, contributed to creating a predatory culture over the [water] resource” (Bengoa, 1988: 186)

⁶⁰ Interview conducted in October 14, 2014

when the *aparciamiento* began during agrarian reform. Like Jeronimo, Aurelio and his father also received water rights along with the plot they bought during the *aparciamiento*: “These water rights are allocated according to the distribution of plotting ... so many hectares for so many water shares ... when my dad partnered with another to buy this plot, they received 15 water shares, which later were divided: 7.5 water shares for the other campesino and 7.5 for us”. Today, Aurelio is a water shareholder from the Asociacion de Canalistas Dadinco in the Nuble river basin, an important water user organization which owns an important portion of water shares from the Nuble river (see Chart 4.2 above).

Like in Isla de Maipo and San Nicolas, in the commune of Colina land expropriations also began around the second half of the 1960s. According to Alfredo from the Asociacion de Canalistas Colina⁶¹, the first estate expropriated was the fundo San Luis in 1965, whose approximately 1000 hectares were allocated to 30 families of peasants. They followed the same stages than the fundo Las Mercedes, Dadinco and other expropriated estates, in which “the water shares and land that belonged to the previous owner were restructured and redistributed as rights by the CORA. They did the land plotting, and each plot [*aparciamiento*] was allocated a certain quantity of both flat and hilly hectares, and a certain quantity of water rights”

⁶¹ Interview conducted in the commune of Colina, December 5, 2014

In practice, the redistribution of land and water shares were the transfer of the means of production from the landowners to the new communities of associated producers, which were going to be individualized during the military dictatorship. This sequence was as follows:

“First, they were owners of plots. Then they started in communities of producers; subsequently they became settled [asentados] and later, during the military government, [some of them] became owners of their land. [Frei and Allende] did not manage to allocate the titles because at that time they were recognized as a community of ex CORA irrigators. [Therefore] during the military government each one of them [campesinos] were granted individual plots, which they had been paying for over the years to the state because in fact they were paying their plots”

This quote highlights an important issue. During the years of agrarian reform, presidents Frei and Allende did not hand over the property titles over the land and water to the campesinos. This was probably because the majority of them were being organized into the asentamientos, and therefore they still were paying off CORA for their lands, so they could not yet receive their land/water titles. This situation is important for the arguments of this chapter because what was at stake was the transfer of the property rights over land and water shares to the campesinos, the legal act by which they were going to become the actual owners of their natural means of production, land and water rights. This was significant as during both the dictatorship (in which Pinochet allocated land and water titles selectively) and under the subsequent period of democracy, in which

the “regularization” of the titles of property over water rights is still an unsolved issue for many ex-CORA peasants.

Oppressive ecologies and the (dictatorial) restoration of landholders’ class power

A large farmer like Benjamin worked regularizing both land and water rights titles during the Pinochet dictatorship in Curacavi⁶². As a lawyer, landowner, and part of the local government, he dedicated a couple of years to regularizing water rights during the 1980s. However, during the process he also participated in the restoration of his grandfather’s fundo which was expropriated during the agrarian reform period. He did so because on his account, the agrarian reform law stated that the expropriated land should be allocated to campesinos and then put into production by those campesinos through their asentamientos and cooperatives. However, the dictatorship persecuted campesinos associated with the left, who received different degrees of punishment (from simple surveillance up to arrests, jail in prison camps, torture, exile and death), and thus many of them could not continue farming. This was used as an argument to say that those lands were not under production, and therefore their beneficiaries were not fulfilling requirements of the agrarian reform law of 1967.

“I sued the state, which is called ‘Benjamin vs. Fisco’, through which I recuperated all the lands because CORA sold the farm [...] It is as if the city expropriated a house to

⁶² Interview conducted in Curacavi, Maipo river basin. December 2 of 2014

construct a plaza and they decided ‘well, this farm is nice, so we’ll just sell it and make the plaza elsewhere’⁶³

These legal actions were accompanied by extra-legal repressive actions against (many) campesinos living within the asentamientos during the dictatorship. This can be seen as a homogeneous strategy by the regime to both intimidate radical campesinos and then to regain the land and water in order to return it to the historic landowners. It was also transferred to other states institutions such as CONAF and even the army (see chapter 3). Jeronimo remembers that “Pinochet did not respect anything, he put all of us in the same group [...] We all become robbers or usurpers of land in this country, and therefore they said: ‘we must punish them’ [...] so then *pagamos justos por pecadores* [we paid the just by sinners]”

The asentamiento and subsequent cooperatives installed in the fundo Las Mercedes are a good example of how a series of legal and extra-legal actions were used to regain land and water by landowners. For instance, when Jeronimo and his comrades in the asentamiento began producing grapes and wine, they soon realized that they needed business networks to sell their wine production. These networks were controlled by the previous landlords and thus not supportive of the campesinos. However, with the emergence of a new class of independent campesinos, during the agrarian reform an entity (cooperative) appeared to begin to buy and distribute the campesinos’ production:

⁶³ Ibidem

“A cooperative was formed here on Isla de Maipo, the Cooperative CoMaipo...other estates producing wines also delivered to CoMaipo as we did too. At the time, we sold them around one million and one million one hundred thousand liters per year”

Jeronimo and his cooperative of wine producers were booming and making good profits until the economic crisis of 1982. That year, they needed cash to buy a new tractor, to be used for complementary agricultural activities oriented towards cultivating potatoes, wheat and other subsistence crops. In order to buy their tractor, they requested a loan of 20 million Chilean pesos from the *Banco de Fomento de Valparaiso*, putting up their 1,019 hectares collateral for the loan. However, as they did not have the land/water titles, they could not demonstrate that they were the actual proprietors and therefore were unable to use the land as collateral. They requested support from the military government’s public official Jorge Prado Aranguiz, the Minister of Agriculture of Chile between 1982 and 1988⁶⁴. He said “OK, we authorize you to sell your land, and we will send you an appraiser from the SAG”

However, the idea of Jeronimo and his community was not to sell the land but only to get the permission from the government in order to show solvency to the bank to get the loan approved, approval of which finally they received. However, in the process, the cooperative that was buying their wine, CoMaipo, declared bankruptcy. Then, Jeronimo and his associates did not have anyone to whom they could sell their wine.

⁶⁴Also President of the *Sociedad Nacional de Agricultura* (Agriculture National Society) between 1989 and 1993

These two events (the bank loan and the CoMaipo bankruptcy) were the beginning of the end for these campesinos in the asentamiento Las Mercedes. Since they lost their wine distributor, they did not have money to cover their loan, so the bank would eventually repossess their lands. In addition, they were already suffering from the harassment and persecution of the military forces, who requested Jeronimo inform them about all the meetings they had within their community. “We had to request permission, and then they sent out five or six *milicos* [soldiers] to come to the meeting to check on what we were talking about”

In order to pay the loan, Jeronimo and his associates were compelled to sell 620 out of the 1,019 hectares, which they were still paying off to the state. However, in addition to the military, the bank, and the Ministry of Agriculture of those days, Jeronimo and his people found another opponent: the mayor of Isla de Maipo, designated directly by Pinochet because in those years there were not democratic elections. This mayor was much clearer about his hostilities to the community of producers in which Jeronimo was participating. Jeronimo recalled that as a mayor he said “I don’t want these people, I don’t want these pieces of shit” because for them “we were a scourge, we were scoundrels who usurped what was not ours. There was no dialogue nor conversation. We were the worst thing in the world for them, we got a bad reputation from everyone working for the regime”

Jeronimo’s community finally sold the 620 hectares to pay the loan to the bank. However, according to Jeronimo, the SAG declared that they sold 1019 hectares, which

was the complete property. The remaining 400 hectares simply disappeared!

Unfortunately for the campesino from Las Mercedes, the SAG did not keep any record of this transaction, which for Jeronimo was a deliberate action of theft.

“They left nothing in writing. So by what right can we claim our land now? Because at that time, if we claimed that we sold the property at gunpoint [...] and the maps from the property were lost [...] The [land] sale was dark, one hundred percent dark!”

As a compensation for this land dispossession, the Ministry of Agriculture finally allocated 61 hectares to Jeronimo’s community of wine producers, which were distributed among the almost 170 families that were living on the asentamiento⁶⁵. “We said: ‘OK, we thank god because at least we kept a small piece of land’”. Although these 61 hectares represent only 6% of their original 1,019 hectares, they are important because their current homes were constructed on this land and they created a small rural village in which these 170 families have lived until today, the so called “Villa Las Mercedes” of Isla de Maipo.

⁶⁵ When Allende took office in 1970, the radicalization of agrarian reform began, bringing urban marginal groups (“pobladore”) into the asentamientos, perhaps as a way of providing them a home, but also of connecting the country side and the city as part of the whole socialist revolutionary project. For this reason, many asentamientos implemented during the Frei government were obligated to receive these groups of poor people coming from the cities. This explains why the original 65 families that Jeronimo said were in the original asentamiento of 1965 grew to 170 families during the Allende administration. These families finally remained living in the fundo during the dictatorship, and they still live there. As Jeronimo put it, “When Salvador Allende won the election, what did they say about the agrarian reform? They said: the Mercedes estate is not for 65 but for 160 or 170 families. So they sent up to 100 *rotos* here, without any qualifications, without any thing ...they started coming, coming, coming without any qualifications, drunken and idle *rotos*...”. *Roto* refers to the most marginal or poorer people, the urban descendants of peones. See Salazar, 1985, 2012

Overall, Jeronimo's life story illustrates some of the strategies used by Pinochet on behalf of the old landowners to re-appropriate their lands lost during the agrarian reform. Where are the remaining 400 hectares? What about their water shares? Perhaps the public officials from the Ministry of Agriculture also declared that the fundo Las Mercedes was not under production and therefore the remaining 400 hectares were taken over by SAG. However, none of this is clear, but probably these lands were auctioned off, as many others were during the same years.

This process of land/water dispossession in the agricultural sector during the dictatorship allowed the re-emergence of the old terratenientes, but also a new class of agribusiness. For instance, forestry (chapter 3) but also pork industry (chapter 5), among others. In any case, both old landowners and new agribusiness were compelled to reorient their production to the new global markets that began to be opened through new neoliberal trade agreements that Chile entered into beginning in the 1980s. For the campesinos who were able to retain their lands, Pinochet allocated land/water titles but as already discussed in chapter 3, often this was done in exchange for political support.

This reconfiguration of landholding during the first decade of the dictatorship (1973-1983) created a new scenario in which the old class of landowner and thousands of campesinos were compelled to adapt to the new neoliberal environment. This included that the campesinos who were able to retain their land/water shares were organized gradually into *comunidades de aguas* (legally recognized but mainly in informal communities or *comunidades de hecho*), and the large landholders reorganized

themselves under the same type of water user organizations. These organizations were already being backed up by the new institutions represented by the 1980 Constitution and the 1981 Water Code, the legal manifestation of this deliberate process of land dispossession and the restoration of the landlords' class power. It was a process that also slowed down, for the second time in Chilean history, the old geographical project of campesinos as independent producers. In the next chapter I will analyze the climatic and socio-political processes since the 1980s which accompanied this neoliberal reconfiguration in the period of post-agrarian reform.

CHAPTER 5

NEOLIBERAL HYDRO-MODERNITY, WATER REFORM, AND THE SCALAR POLITICS OF IRRIGATORS: EXPLORING ALTERNATIVES FOR DEMOCRATIZING WATER GOVERNANCE IN CHILE

“...It is not only because water scarcity has been exacerbated by the long drought we are experiencing, but also because of the overexploitation of river basins and the misuse of water rights. That's why we have proposed recognizing water as a national public asset in its various states, which would substantially change the [1981] Water Code”

Michel Bachelet, President of Chile, 2014, p. 20

“This type of substantive reform generates uncertainty and fear, and it contradicts our [1980] Constitution, which stipulates that all water rights are property of their holders, who can *use*, *enjoy* and *dispose* of them without [any] limitations”

Patricio Crespo, President of the National Society for Agriculture, 2014, p. 9

[Cursives added]

Introduction

In this chapter I continue analyzing irrigation development in its current neoliberal hydro-modernity stage (1980-2015), in which water is once again defined as private property through the process of *water re-privatization*, a situation that since the end of the 1990s has been coupled with growing drought and the overexploitation of both surface and ground water. I analyze the intertwined nature of these socio-ecological processes through the proposed notion of hydrosocial metabolic rifts, which are associated with economic monopolies, speculation with water rights and the ecological depletion of rivers and aquifers. These are among the main reasons why during the last decade the state has decided to gradually intervene, in order to attempt to manage the water crisis affecting the country, its regions, people and environments. This is the context for the 2014 water reform that has been accompanied by a growing environmental/water movement, which I will review in detail in chapter 6.

In this chapter, I explore how during the last three decades water user organizations have been reconfigured due to agrarian and counter-agrarian reform, which gave rise to the birth of new water subjects under the new era of neoliberal hydro-modernity (section 1). Then, I analyze the climatic and political-ecological processes by which the water crisis was produced, using the proposed notion of hydrosocial metabolic rifts (section 2). Finally, I analyze the state's response to this water crisis through a description of the main components of Bachelet's 2014 water reform. I argue that there is a growing governmentalization by the Chilean state in water affairs, which in turn is opening up new opportunities for discussing what the role of irrigators is (and what it could be)

within the broader perspective of the different water subjects involved in ongoing struggles for democratizing water governance at both the river basin and national scales.

1. Differentiation of water user organizations and the emergence of new water subjects during the 1980s, the rainy decade

Climatically, the 1980s was a wet decade in Chile. Many interviewees concurred that the main elements sustaining the current neoliberal model of water management in Chile (the 1980 Constitution and 1981 Water Code) were enacted in what is known as one of the wettest decades in the twenty century. For these reasons, the proponents and defenders of the 1981 Water Code argue that it is not fair to assess or judge this legal body under the rubrics of droughts and climate change that is affecting Santiago and the center-south of the country, but they recognize that this legal body can be improved and adapted to the new hydro-climatic situations. In effect, the process of privatization and land/water dispossession employed during the 1980s had generous precipitation as a foundation.

It was in this context that a differentiation within the water user organizations, as consequence of the agrarian and counter-agrarian reforms, occurred. In fact, important social class differences between the ex-CORA campesinos and the other traditional landholders and agribusinesses have emerged since the 1980s, class differences that have continued evolving during the 1990s and 2000s. I suggest that this differentiation can be framed as a general distinction between Traditional and New Water Subjects. This also applies to water subjects outside the agricultural sector, such as corporate powers in the

forestry and hydropower sectors; these include the state, civil society and NGO groups (Chart 5.1)

Chart 5.1 Traditional and New Water Subjects in Chile

STAKE-HOLDER	Traditional Water Subjects (until 1973)	New Water Subjects (since 1974)
Water User Organizations	<i>Consumptive water right holders</i> 1) Agriculture: landlords	<i>Consumptive water right holders</i> 1) Agriculture: 'modernized' landlords; new agribusiness; campesinos
Corporate power	2) Forestry: state 3) Hydropower: state*	2) Forestry: private ⁶⁶ <i>Non-consumptive water right holders*</i> 3) Hydropower: private ^{67*}
State	Liberal/Keynesian/Socialist	Neoliberal/Post-Neoliberal?
Campesinos	<u>Independent</u> : peasants, local small farmer <u>Semi-dependents</u> : sharecroppers, renters, others; <u>Dependents</u> : <i>inquilinos</i> , <i>peones</i>	<u>Independent</u> : peasants, g-local small farmers, 'residential plots' <u>Semi-dependents</u> : sharecroppers, renters, others; <u>Dependents</u> : rural workers, <i>temporeros</i> Rural Potable Water (APRs) Peasants without water
Indigenous people	Mapuche communities	Mapuche movement*
Civil Society and NGO's	?	Urban-rural environmentalisms* Anti-dam activism* Water movements*

Source: own elaboration. (*) Chapter 6.

⁶⁶ The forestry sector is the second most important consumptive water rights holder after irrigated agriculture (Saavedra et al, 2014). However, forestry corporations do not participate in the water user organizations, because as we have seen, these organizations have been historically designed for and implemented by irrigators. However, given the growing socio-ecological and political relations between forestry and agricultural developments, no doubt there is an increasing need for coordination among these water subjects in relation to water uses at the scale of river basins

⁶⁷ Hydropower corporations do not participate in the water user organizations either

The reconstruction of the Chilean hydrosocial metabolism indicates that one of the most important processes occurred after the water/land and class struggles experienced under Allende's socialist hydro-modernity and its subsequent dismantling during Pinochet's neoliberal hydro-modernity, was that water user organizations experienced an internal differentiation that reflected these processes of socio-spatial struggles over water and land.

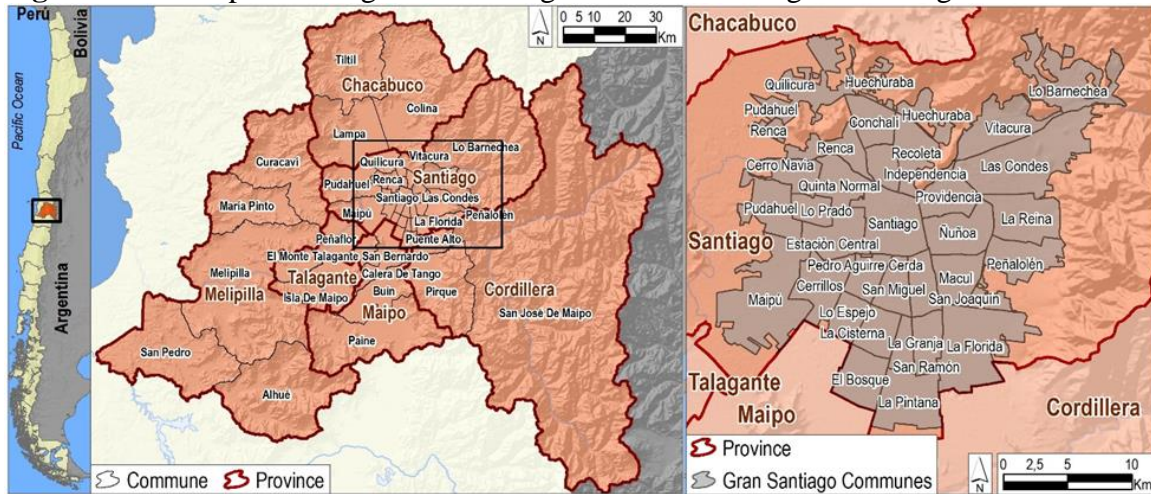
Campesinos who were able to retain their land and water shares (with or without their titles of property) naturally began to participate as (minority) water shareholders in different *Comunidades de Agua* and *Asociaciones de Canalistas*. The old landholders continued exercising their traditional social power as the (majority) water shareholders within these organizations, powerful positions that remain until today. Moreover, at the same time and through the new scenario of water markets, emerging agribusinesses capitalists began to buy lands and water shares from both campesinos and landholders, in order to sustain their new geographical projects within the river basins. Thus, between the 1960s and 1980s, the homogenous composition of the water user organization, which had been dominated by landlords since the nineteenth century, experienced an internal differentiation that reflected the socio-political struggles that had occurred during those decades of socialist revolution and neoliberal counter-revolution. Campesinos and agribusinesses emerged as new subjects participating as water rights shareholders within the water user organizations.

Apparently, the way in which they became transformed into water shareholders is completely different. While campesinos holding land and water shares were, in certain

way, water subjects produced by the socialist state oriented to creating a more egalitarian society, the new classes of agribusiness are a kind of new water subject produced by the neoliberal state oriented to creating a market based society. This market based society was the hegemonic and global geographical project that in Chile was applied by the authoritarian military power since 1974 as a form of *shock therapy* (Valdes, 1995; Klein, 2007). In other words, while campesinos gained their water shareholder positions through the state after decades of struggle for land and water, agribusiness did it mainly through the market mechanisms based on the 1981 Water Code, by which investors and capitalists can: a) request water rights directly from the DGA, or b) buy water shares from other actors (large/medium farmers and/or campesinos). All this occurred under the new political-ecological context of the neoliberalization of natural commons after the brief but meaningful socialist process of Allende.

The example of the pork industry's development in the Maipo river basin is illustrative of this process. The industry and its main corporation, AGROSUPER, is originally from the O'Higgins region (south of Santiago), and it began to invest in the San Pedro commune at the end of the 1980s. San Pedro is located in the dry lands of the coastal cordillera, downstream from the Maipo river basin (Figure 5.1)

Figure 5.1 Metropolitan Region of Santiago and Gran Santiago according to communes



Source: Center for Environmental Sciences EULA-Chile

In this area, the main water sources are the aquifers. According to Alexis⁶⁸, when AGROSUPER arrived in San Pedro they did not have water rights. Therefore, they began to request water from the DGA: “It all began after the process of agrarian reform. [When] AGROSUPER was installed in the area, I think with some hydro-geological studies, they began to request large amounts of water rights”. In effect, according to the *Catastro Publico de Aguas* (Public Cadaster of Water) from the DGA⁶⁹, this company began to apply for underground water rights starting in 1995, their last request being made in 2011. They have a total of nine requests for water rights in the cadaster, which total 454 liters per second in the commune of San Pedro (DGA, 2016a). According to peasants from San Pedro, principally dedicated to cultivating berries, raising chickens, and producing eggs and livestock (cows, sheep), the extraction of these large amounts of water in these dry lands has been affecting them because their wells have gone dry. This

⁶⁸ An activist and one of the founders of the water movement *Juntos por el Agua* (All Together for Water), a lawyer, and a legal adviser for the Deputy Denise Pascal Allende, niece of Salvador Allende. Interview conducted in Melipilla, November 26 of 2014.

⁶⁹ This information can be found at http://www.dga.cl/productosyservicios/derechos_historicos/Paginas/default.aspx

occurs in a specific way. The wells operated by AGROSUPER—which sustain the production of around two million pigs maintained within several plants situated in the commune—are deeper than these small wells operated by producers of berries, who through their *campesino small wells* used to pump water for both their own consumption and to irrigate their crops. Once AGROSUPER began to construct *industrial deep wells* to pump large amounts of water from the commune’s aquifers, the campesinos living in this area have witnessed how their small wells (*norias*) have been systematically dried up because of this emerging pork industry. As stated by other members of the water movement *Juntos por el Agua*, “What happens is that large wells extract water in detriment to the small ones. All our wells are being rendered useless. Our small wells dry up and therefore the people are left without water ... This issue is not only damages us, the small producers, but them as well, because there will come a time when they will not have water either”⁷⁰

This process of large corporations privately appropriating aquifers illustrates the landscape of the new era of neoliberal hydro-modernity, which is characterized by the campesinos being dispossessed of water. This problematic configuration has been created by new agribusinesses who got their water rights under the new market mechanisms installed by the 1981 Water Code, in this case, through the direct request of water rights from the DGA. Similar to the strategy of forestry corporations buying campesinos’ land in Biobío, the hydrosocial history of the pork industry in San Pedro

⁷⁰ Constanza and other campesinos, group interview conducted in the commune of San Pedro, November 27 of 2014

highlights how the relationships between campesinos and these new agribusinesses have evolved toward hydrosocial conflicts. During my week-long visit to the different sectors of the commune of San Pedro, I also observed how on these dry lands there are small and medium estates with forestry plantations, mainly eucalyptus but also several pines. Therefore, in addition to the pork industry there are also growing forestry pressures on the commune's aquifers, which really makes things worse for local campesinos.

Thus, under the new neoliberal hydro-modernity, the remaining communities of the old campesino class (and their children) must cope with both the old landlord class (who are still there) but also with the emerging agribusiness classes that are constructing new geographical projects in their territories. The new neoliberal hydro-modernity scenario makes the social struggles over water resources much more complex than in the previous Liberal, Keynesian and Socialist hydro-modernities, a situation which has worsened since the late 1990s and 2000s due to new episodes of drought and growing water market failures.

However as I said before, during the 1980s this situation was not anticipated because that was a 'wet decade'. Many storms and flooding occurred (once again) in Chile and particularly in Santiago, destroying infrastructure and overflowing the main rivers. For instance, in the winter of 1982 Mapocho overflowed and razed some areas of Santiago, killing some dozens of people, destroying almost 2000 homes, bridges, streets, and highways, among other urban infrastructures⁷¹. In 1987, the Colina river also

⁷¹ See the video: <https://www.youtube.com/watch?v=kiDZKOv53go>

overflowed and flooded the urban area of the commune. Alfredo⁷² clearly remembers that day because “Here in 1987 was *the last flood*, which destroyed the canal gates ... that was the last year that there was a flood here. We saw mattresses and tables flowing here down through the streets. The river overflowed completely. Since then, we haven’t had similar situation. We channeled the Colina river, which was paid for by us and partly by the DGA... The project was aimed at avoiding flooding in the future”

If the canalization of Mapocho river at the end of the nineteen century was aimed at supply drinking water for the people and producing a more “hygienic city”, the canalization of the Colina river at the end of the 1980s was directed towards protecting the local people from water related disasters. Importantly, Alfredo remarked that that was *the last flood*, the last time he and the water shareholders from the *Asociacion de Canalistas Colina* saw the river flowing with surface water. Although it was too much water, Alfredo recalled it as “good times” for irrigation because during the 1980s they were able to use all their water rights. Due to decreasing water flows, Alfredo said that irrigators from Colina “have water rights for 3,000 liters per second [but] today we are receiving 556 liters”. Alfredo means that since the 1990s the Colina river has been steadily drying up, as have many other surface and underground water sources in the Maipo river basin, which has affected the amounts of water shares extracted by the *Asociacion de Canalistas Colina* and other irrigators from different rivers in the basin.

⁷² Manager of the *Asociacion de Canalistas Colina*. Interview conducted in Colina, December 5 of 2014

As the 1980s was a wet decade with abundant precipitation, one could speculate that that was the main reason why the Pinochet administration did nothing regarding canal infrastructures and irrigation programs oriented to developing the different classes of farmers and irrigators that were being internally restructured by the agrarian and counter-agrarian reforms. Although a new *Ley de Riego* (Irrigation Decree Law) was enacted in 1982, the Pinochet dictatorship and its civil politicians (associated with the current right-wing party “UDI”) did not promote irrigation development, a situation recognized by both large farmers and campesinos. For instance, Maipo river basin’s large farmers like Benjamin mention that Pinochet “did virtually nothing regarding new irrigation surfaces”⁷³. Campesinos from the Nuble river basin agree with this large farmer’s statement, but they also emphasize the selectively repressive politics of Pinochet against them because “peasants and small-farmers we were being killed. Pinochet began this assassination because he never provided support for the small peasants. He never provided any help nor assistance for us, nothing. He only took away our land to give it to the rich people”, stated Aurelio, a peasant from the commune of San Nicolas, and *celador* [canal judge] for the *Asociacion de Canalistas Dadinco*, Biobio region.⁷⁴

However, as a reflection of the new (non-democratic) institutions and rules created by the dictatorship that restored the pre-1967 notion of water as private property (1980 Constitution, 1981 Water Code), the water user organizations—mainly through

⁷³ Interview conducted in Curacavi, Maipo river basin. December 2 of 2014.

⁷⁴ Interview conducted in San Nicolas, Nuble river basin. October 14 of 2014.

their traditional faction of landlords—organized the already mentioned national entity called the “*Confederación de Canalistas de Chile*”, which grouped together different *Juntas de Vigilancia* and *Asociaciones de Canalistas* from Arica to the Biobio region. This was an important step forward in the growing scalar politics of traditional irrigators. It is worth noting that this politicization of irrigators was closely associated with the restoration of lands during the 1980s and then has gradually evolved toward defending the private model of water management (re)installed in a new historical form by Pinochet’s neoliberal hydro-modernity. The organizations met for the first time in 1986 in Santiago, and since then they have had at least eight national meetings in different regions and cities of the country (Chart 5.2).

Chart 5.2 Meetings of the *Confederación de Canalistas de Chile* (Confederation of Canal Users of Chile)

Year	Meeting	City
1986	I Convención Nacional de Regantes de Chile	Santiago
1989	II Convención Nacional de Regantes de Chile	La Serena
1993	III Convención Nacional de Regantes de Chile	Los Ángeles
1997	IV Convención Nacional de Usuarios del Agua	Arica
2000	V Convención Nacional de Usuarios del Agua	Ovalle
2012	VI Convención Nacional de Usuarios del Agua	Chillán
2013	VII Convención Nacional de Usuarios del Agua	Rancagua
2014⁷⁵	VIII Convención Nacional de Usuarios del Agua	Arica

Source: author’s elaboration

As can be observed, until 1993 their meetings were called the “National Convention of Irrigators from Chile”, but since their 1997 meeting, they have been called the “National Convention of Water Users”. Maybe it is just semantic, but I think the changing of the word “irrigators” for “water users” is important, as I will discuss in

⁷⁵ * Presentations available at: <https://www.youtube.com/watch?v=Ckz00YfDIXQ&index=5&list=PLJtIYKzqP7Nfl6AUpBJ4Q8DwHyqM6zQfb>

section 3 of this chapter. Also, the chart shows that they met twice during the 1990s, precisely when there were the first (failed) attempts to reform the 1981 Water Code undertaken by the *Concertacion*⁷⁶ in two rounds: 1990-1993 and 1996-2003 (Bauer, 2004: 51-73). All these controversies and political struggles to reform the 1981 Water Code during the 1990s ended with the (non-substantive) reform of 2005 in which one of the most important innovations was to tax the non-consumptive water rights through fees for non-use (Bauer, 2013). Coincidentally, they also met in three consecutive years (2012, 2013 and 2014), in which the most recent and critical period was characterized by a sustained drought which affected the country, but also a period of planning and design of the water reform.

2. Water market failures, drought, and the hydrosocial metabolic rift of development

In effect, since the mid-2000s there has been a growing water crisis in the center-south of the country. Different studies have reached similar conclusions: the precipitation has systematically declined in the Santiago (Meza et al, 2012; Welz et al, 2016) and Biobio regions (Rojas, 2013; Torres et al, 2015). The rainy 1980s were followed by a growing aridity and water scarcity in the late 1990s (the drought of 1998-99, see Bauer, 2009) and from the mid-2000s onwards. Moreover, the economic pressures and overexploitation of aquifers and surface water have been expanding through new geographical projects developed in the different river basins across the regions in the

⁷⁶ The center-left coalition of political parties (DC, PS, PR, PPD) that governed the country between 1990 and 2010

country, which coupled with both monopoly power and speculation with water rights, has produced a growing water crisis in the nation dominated by neoliberal hydro-modernity. In this section, I analyze this water crisis under the proposed notion of hydrosocial metabolic rift, which explores the different mechanisms through which people are being separated from (or dispossessed of) their direct access and control over their traditional water sources. The water crisis is especially affecting poorer people in rural areas, represented here by the new populations of peasants without water. They are the main target for the new state policies or water governmentalities oriented towards managing the growing water scarcity that is even threatening the water for human consumption.

Water scarcity is expressed in different ways in the geography of river basins. What is particularly relevant in the neoliberal hydro-modernity is that water scarcity is not only an ecological issue related to climatic variability and cyclical droughts, but also a legal and administrative process related to the neoliberal model of water rights. Many interviewees mentioned that the *over-allocation of water rights* by the DGA to private capital—who have been requesting water rights for free in order to develop their geographical projects—have created a situation in which the quantities of water rights allocated (expressed in water shares and/or liters per second) are frequently higher than the (changing amounts) of existing water flows in both surface but especially ground water at the scale of river basins. This situation is particularly acute in the Maipo river basin, in which since at least 2008 a water crisis has been officially declared. Indicators of this hydro-crisis are the several actions undertaken by different governmental agencies, including the DGA and the Ministry of Agriculture. For instance,

since 2008 the Ministry of Agriculture has decreed a new policy, the so called *Emergencia Agrícola* (Agricultural Emergency), which can be declared if water shortages (but also flooding, freezing and volcanic eruptions) destroy or threaten to completely destroy the crops in an important area, such as a complete region or several regions in the country. The declaration of an area as agricultural emergency allows the authorities to allocate extra-resources to go to the rescue of farmers in order to save their crops and animals, helping them with important provisions such as forage, seeds, bee fructose, climate insurance, and the facilitation of credits and loans, etc. Since 2008, the Ministry of Agriculture has declared an agricultural emergency due to water shortages several times. For instance, in 2008 the 61.1% of the communes in the country (222 out of 346) were declared under agricultural emergency (ODEPA, 2012: 2). 50 out of these 222 communes were located in the Biobio and Santiago regions. In 2015 the situation is worse in these two regions, because once again the Ministry of Agriculture has declared agricultural emergency due to water scarcity in 66 communes of Biobio and Santiago, all of them in rural areas (Table 5.1)

Table 5.1 Number of communes under Agricultural Emergency due to Water Scarcity in Santiago and Biobio, 2008-2015

Region	Year							
	2008	2009	2010	2011	2012	2013	2014	2015
Santiago	4	0	0	0	9	3	0	19
Biobio	46	0	0	0	0	0	0	47

Source: elaborated with data from ODEPA, 2012, p. 2; Nunez et al, 2013, p. 25; and <http://agroclimatico.minagri.gob.cl/emergencias/> [accessed: February 23, 2016]

In Santiago, the communes most affected by water shortages are those located in the northern area (Colina, Til-Til, Lampa) and the dry lands of the coastal cordillera (Alhue, San Pedro, Melipilla, Maria Pinto, Cucacavi). In Biobio, almost the complete region (47 out of 54 communes) is under agricultural emergency. The socio-natural causes and geographical projects producing these water shortages are different in Santiago and Biobio. While in Santiago the interviewees relate them to an over-allocation of water rights to mining (northern area), the industry and other agribusiness (particularly in dry lands of the coastal cordillera), in Biobio the main causes are associated with forestry development. In sum, in both regions people relate the water scarcity to the drought but also to the overexploitation of aquifers by large corporations and agribusiness.

For instance, the commune of San Pedro in the Maipo river basin is not only affected by the pork industry. In 2010, an American company from Utah arrived in the area to begin to cultivate olives to produce extra virgin oil for exports⁷⁷. They bought 3,500 hectares of property in the commune from a local landlord called Ricardo Ariztia, who had his land and water rights since 1974 in the communes of Talagante, Melipilla, and San Pedro⁷⁸. Ariztia is a recognized businessman in the agricultural sector and was president for almost four decades of the *Asociacion de Canalistas Canal Las Mercedes*. In 2010, he was nominated as the INDAP National Director for the new right-wing

⁷⁷ See the company website at <http://www.chileoliveoil.cl/>

⁷⁸ https://es.wikipedia.org/wiki/Ricardo_Ariza%C3%ADa_de_Castro

government of Sebastian Pinera (2010-2014). According to peasants from San Pedro, Ariztia had to sell (or transfer) his lands, water rights and companies to assume this important position⁷⁹. Thus, in 2011 this American company, with the local name of “Agroreservas de Chile SA”, bought lands and water rights from Ariztia in San Pedro. Since then, they cultivated olive trees to produce olive oil for export, for which they are making use of lands and underground water rights that they bought from Ariztia. According to the Public Cadaster of Water of DGA (DGA, 2016), in June of 2011 Agroreservas de Chile SA did 25 inscriptions for underground water rights in the commune, for a total of 991 liters per second. That’s a lot of water being pumped from the aquifers in a rural commune in which almost its entire population (around 8,000 people) are being serviced by water trucks from the municipality since precisely 2011⁸⁰. These 25 inscriptions mean 25 deep wells. However, according to local peasants, “if you ask the DGA they say 25 wells, but the people working there says there are many more than 100 [wells]”⁸¹. The *people working there* are frequently the families of these campesinos, who also are the main rural labor force working in the pork industry plants. Therefore, they are completely aware that the large amounts of (underground and consumptive) water rights accumulated by this large transnational company are only

⁷⁹ In Chile, individuals holding positions of *Alta Direccion Publica* (High Level Public Officials) must declare their personal patrimony (bank accounts, properties, etc.) before they assume their positions. In case they have conflicts of interests between their public positions and their private businesses—as was the case of Ariztia—they must sell or transfer the management of these companies to other persons outside their family circle.

⁸⁰ Areli, municipal manager of water trucks in Municipality of San Pedro. Interview conducted in November 26 of 2014.

⁸¹ Constanza and other campesinos of the water movement “Juntos por el Agua”. Group interview conducted in the commune of San Pedro, November 27 of 2014

official statistics, because in practice they are extracting much more water. As put by Abigail, the Presidential Delegate’s coordinator for the metropolitan region of Santiago⁸², “The great struggle that people have here in the metropolitan region is that they ask: Why? The neighbor—who is not even national but transnational—comes and buys full estates, makes deep wells of 100 or 200 meters, has water to irrigate a lot of olive’s trees, yet they [the peasants] have no water to irrigate their berries. [There are] a lot of wells, lots of olive trees growing; but on the other hand, these people do not have water to drink nor water to work [their lands]”

This is an example of how the metabolic interactions of the water market, the drought, and the economic power of large corporations are producing new hydrosocial metabolic rifts in the Maipo river basin, dispossessing local people of their water resources. However, the large corporations are not only leaving local people without water, but also depleting the aquifers and creating environmental degradation problems which are very difficult to reverse.⁸³ This situation is also eliminating the possibility that the DGA will allocate more water rights in future because, simply put, “there will be no more water to allocate”.

In light of growing water scarcity, the DGA began using some of its (small) regulatory power to cope with this problematic configuration. For instance, the DGA

⁸² Abigail, engineer and public official of the Ministry of Interior. Interview conducted in Santiago Centro, December 3, 2014.

⁸³ “Depleted aquifers get compacted and will never be able to store water at their previous capacity. This is [also] a key problem in the central valley of California, i.e. they are undermining conditions of (future) production”. Dr. Bob Bolin, Arizona State University, personal email communication, March 16 of 2016.

began to enforce an article of the Water Code⁸⁴ by which the DGA has the authority to declare as *Areas de Restriccion* (Restriction Areas) certain hydro-geologic zones in which exist the risk of serious depletion of aquifers, which could eventually affect the water rights already allocated to other users in the zone. The declaration of a restriction area means that the DGA cannot allocate new water rights in that area. The interesting thing is that according to this Water Code article, the water rights holders being affected are responsible for requesting this declaration of restriction from the DGA. Under this legal figure, since 2001 the DGA has declared several restriction areas in the country. According to public data available online and focusing in my two research sites or regions, only the DGA from the Santiago region has declared restriction areas (in Biobio there are not records of it), which illustrates the high pressure exerted by the growing economic activities in several Maipo river basin's aquifers. In fact, the whole Maipo river basin has been declared as a *restriction area* (Chart 5.3)

⁸⁴ Article 65: “Serán *áreas de restricción* aquellos sectores hidrogeológicos de aprovechamiento común en los que exista el riesgo de grave disminución de un determinado acuífero, con el consiguiente perjuicio de derechos de terceros ya establecidos en él”. Source: Water Code, available at <http://www.leychile.cl/Navegar?idNorma=5605> (the cursives are mine)

Chart 5.3 “Restriction Areas” resolutions made by the DGA for the Santiago region, 2001-2011

Year	Hydro-geologic sector (Aquifer)	Communes	DGA Resolution number	Date
2001	Chicureo	Colina	62	January 23
2001	Colina inferior	Colina	540	September 21
2004	Mapocho Alto	No data	293	July 27
2005	Til-Til, Chacabuco-Polpaico, Lampa, Colina Sur, Santiago Norte and Santiago Central	Til-Til, Colina, Lampa, others	286	September 1
2005	Yali Alto	San Pedro	371	October 27
2008	Puangué-Melipilla	Curacavi, Maria Pinto, Melipilla	241	July 31
2008	Paine	Paine	276	September 24
2008	El Monte	El Monte, Talagante, Isla de Maipo, Melipilla, Buin, Peñaflor, Paine	277	September 24
2011	Pirque-Buín	Pirque, Puente Alto, San José de Maipo; La Florida, La Granja, San Ramón, La Cisterna, El Bosque, La Pintana; San Bernardo, Buín, Calera de Tango, and Paine	252	October 21

Source: elaborated with DGA documents on “Áreas de Restricción de Aguas Subterráneas” (DGA, 2016b)

In addition, the DGA also has the authority to declare “*Áreas de Escasez por Sequía*” (Area of Water Scarcity due to Drought), but unlike the Restriction Areas, the declaration of Area of Water Scarcity due to Drought is made by the President of the Republic upon a DGA request⁸⁵. Under this figure, since 2008, both Santiago and Biobio

⁸⁵ Water Code, Article 314: “*El Presidente de la República, a petición o con informe de la Dirección General de Aguas, podrá, en épocas de extraordinaria sequía, declarar zonas de escasez por períodos máximos de seis meses, no prorrogables. La Dirección General de Aguas calificará, previamente, mediante resolución, las épocas de sequía que revistan el carácter de extraordinarias. Declarada la zona de escasez, y no habiendo acuerdo de los usuarios para redistribuir las aguas, la Dirección General de Aguas podrá hacerlo respecto de las disponibles en las fuentes naturales, para reducir al mínimo los daños generales derivados de la sequía. Podrá, para ello, suspender las atribuciones de las Juntas de Vigilancia, como también los seccionamientos de las corrientes naturales que estén comprendidas dentro de la zona de escasez [...]*”.

regions have been declared as zones of water scarcity due to drought (Chart 5.4).

However, unlike the Restriction Areas which are permanent and close the allocation of new water rights⁸⁶, the Zones of Water Scarcity by Drought last only six months with no extensions and the DGA can allocate new water rights for people who need them, particularly for human consumption and irrigation. This policy seemingly assumes that droughts are temporary hydro-climatic events, which in Chile are influenced by the El Niño-Southern Oscillation (ENSO) (Montecinos et al, 2010)

Chart 5.4 Zones of Water Scarcity by Drought decreed by DGA for Santiago and Biobio regions, 2008-2015

Year	Region	Commune/s	Province/s	River basin/s	Decree number	Date
2008	Santiago	San Pedro	Melipilla	Maipo	125*	January 29
	Biobio		Nuble	Chagatal, Larqui, Ñiquén and Perquillauquén	125*	January 29
	Santiago	Alhue, Melipilla/ Colina and Til-Til	Melipilla/ Chacabuco		153*	February 15
	Biobio		Nuble	Renegado	153*	February 15
2009	Biobio		Nuble	Ñiquén and Perquillauquén	110	February 4
2011	Santiago	Melipilla	Melipilla	Maipo	157	February 17
	Santiago	Til-Til	Chacabuco	Maipo	186	April 13
2012	Santiago		Melipilla	Maipo	29	January 20
	Santiago	Til-Til	Chacabuco	Maipo	178	April 4
2014	Biobio			Laja	18	January 18

Source: elaborated with data from DGA (2015) (*) Decree involves other regions as well

⁸⁶ Unless other water users request to open the case to the DGA, in order to see if they can request additional water rights

According to the Water Code, if during the six months the decree of zone of water scarcity due to drought lasts, the irrigators and their water user organizations do not agree on how to redistribute the (scarce) water—e.g. from irrigation to domestic consumption—the DGA will be able to redistribute waters coming from natural flows (e.g. rivers, aquifers). In doing so, the DGA will be able to “suspend the powers of the Juntas de Vigilancia, as well as the sectioning of natural streams that fall within the zone of scarcity” (Water Code, article 314)

The extreme situation in which the DGA could eventually temporarily “suspend” the authority of the *Juntas de Vigilancia* to manage the river (or river sections) has not happened yet in Santiago during the last decade, but it is highly likely that it will happen soon, as during the canalization of the Mapocho river at the end of the nineteenth century. According to Natalia, a civil engineer and the DGA director for the Metropolitan Region of Santiago⁸⁷, “The irrigation in the region, in terms of vegetables, some fruits, etc., is quite well supplied by the canal networks. I would say that [irrigator’s] organizations are generally well structured ... I am not saying these are super good years in terms of water availability. *We are in years of restriction*. However, the irrigators and their water resources are not as diminished as the water for people living in the dryland”. Natalia is referring to peasants without water from the communes of San Pedro, Melipilla, Alhue and the whole west side of the Maipo river basin, which along with the northern side

⁸⁷ Interview conducted in Santiago city, November 14 of 2014,

(Colina, Til-Til, Lampa) are the main geographical spaces declared as both restriction areas and zones of water scarcity by drought (Charts 5.3 and 5.4).

Irrigators recognize that the growing water shortages due to overexploitation and the drought is affecting the poorer peasants in rural areas, but unlike the DGA's director, they argue that they also are being affected because they cannot completely exploit their estates and irrigated areas. For instance, a large farmer like Benjamin from Curacavi stated that "we have 2,400 hectares and with the legal documents [water rights], we could irrigate about 600 hectares. Nonetheless, today in the middle of drought, we are only irrigating 42 hectares, the majority of them with groundwater [because] there is no surface water"⁸⁸

Growing water scarcity, like in the previous centuries, is affecting the quantities of (surface) water that irrigators extract from their respective canals and sub-canals. However, in order to make the "adjustments" between these ecological flows and their legal water rights, during the last two centuries they have developed a practice known as "*prorrrateo*" (apportion) or "*aliquota*" (ration), which basically means to divide the existing flows of water proportionally according to the water rights (or liter per second) that each irrigator holds in their respective canal or sub-canal⁸⁹. In Pirque, irrigators know

⁸⁸ Interview conducted in Curacavi, December 2 of 2014

⁸⁹ As illustrated with the cooperative of wine producers in Isla de Maipo (chapter 4), since the second half of the twentieth century, irrigators are also drilling the land and pumping groundwater to irrigate their crops. For them, *individual groundwater supply for irrigation is very important, but it is expensive*. In effect, to pump water implies extra spending in motors and the energy used to put them to work, like gas, oil and/or electricity. In practice, the majority of large farmers and agribusiness have deep well to irrigate their crops, but the peasants and small farmers cannot do the same because deep wells are expensive.

this procedure very well. Ezequiel, the manager of the *Asociacion de Canalistas de Pirque*, explains how this *prorratio* is made by the Junta de Vigilancia, the authority that distributes the water from the natural river to the canals: “[They] say, for example, ‘the river today has 100m³, then, they take these 100m³—which are 100,000 liters per second—and they divide them by the 8,500 water shares [of the Maipo river], which gives a value of almost 12 liters per water share. So for us, as we have 635 water shares of the river, they multiply 635 by 12, then they say “your canal corresponds to 7.6m³ today”⁹⁰.

Under this mechanism of *prorratio*—which in the most advanced canals like Pirque is based on complex software systems measuring the river and canals flows in real time—the water user organizations have been adapting to the growing lack of water⁹¹. It is interesting to note that these 100m³ per second, according to Ezequiel, represent around 25% of the historical ecological flows of the Maipo river. For instance, in the 1980s “we had an average of 400, 500m³ per second during the summer or irrigation season. Today, we barely reach the 160m³ per second in the same season”⁹². In any case, as mentioned by the DGA director, the irrigators from the Maipo river basin do not have serious problems to irrigate because even with 25% of their historical flows, they can irrigate and

Instead, they traditionally have used small wells (*norias*, *pozo zanja*) and “*punteras*”, many of which are being dried up because of the drought but mainly because the “competition” from deep wells.

⁹⁰Interview conducted in Pirque, November 12 of 2014

⁹¹ Seminar “Reforms to the Water Code: the vision of Water User Organizations”, organized by the Law School of the Catholic University of Chile. Santiago, December 2 of 2014

⁹² Interview conducted in Pirque, November 12 of 2014

continue developing their agricultural activities. One of the main reasons is that irrigators have improved the irrigation's efficiency, replacing old irrigation techniques such as “*riego tendido*” (flooding) by “*riego por goteo*” (drip irrigation), among other technologies for irrigating. In any case, these technologies are not fully accessible (due to high prices) to peasants and small farmers, who continue using mainly gravity and the traditional irrigation systems. Therefore, the new irrigation technologies are used mainly by large farmers, and particularly in the Santiago region due to better soil and climatic conditions compared with Biobio. In effect, the most productive soils from Chile are located in the Santiago region⁹³ (Table 5.2)

Table 5.2 Irrigation systems in Santiago and Biobio regions according to irrigated surface (ha)

Irrigation System	Sub-type	Region (ha)		Chile (ha)
		Biobio	Santiago	
Gravity	“Tendido” (flooding)	126,204.1	32,772.92	453,325.82
	“Surco” (groove)	13,989.71	57,072.38	311,152.05
	Other traditional	2,748.5	1,044.82	25,362.54
Mechanical	Traditional Sprinkler	5,480.6	793.13	30,071.58
	Pivot or reel	11,499.2	3,006.7	26,426.69
Micro-Irrigation	Drip and Tape	5,471.69	37,281.32	209,348.9
	Micro-Sprinkler & Microjet	1,061.41	4,761.07	38,125.33
TOTAL		166,455.21	136,732.34	1,093,812.91

Source: elaborated with data from the Agricultural Census of 2007. See INE (2007), Cuadro 5 [Chart 5].

⁹³ Dr. Jose L. Arumi, Professor in the Department of Water Resources and Dean of the Faculty of Agricultural Engineer at the University of Concepcion (Chillan), Personal Email communication, March 7 of 2016. Dr Arumi is also a Principal Investigator for the “Water Research Center for Agriculture and Mining” (CRHIAM) in the University of Concepcion. URL: <http://www.crhiam.cl/>

In the Nuble river basin the hydrosocial situation is similar to Maipo: dry. According to Jorge, an engineer and the Nuble Province's DGA director⁹⁴, since 2008 the precipitation (both rainfall and snow in the Andes) has been decreasing in the area, what has principally affected the small wells of peasants who live in the dry lands of the coastal cordillera, which are mainly covered by forestry plantations. As a consequence, the Nuble river's ecological flows are also diminishing. According to Aurelio, the peasant and *celador* (canal judge) for the *Asociacion de Canalistas Dadinco*, the drought is "severe". For instance, it is obligating to some farmers to choose between their pastures (oriented to feeding the livestock) and their crops (oriented toward supplying local and global markets), and in the end giving priority to irrigating the crops to the detriment of the pastures. As *celador*, during the irrigation season Aurelio must walk through the Dadinco canal, from the bocatoma (water intake) located in the Nuble river until the last water user, checking that all the "marcos partidores" (divider frames) for each sub-canal are extracting the correct amounts of liters per second according to their historical or customary water rights, and/or their respective titles or other documents certifying their water rights. Recalling these routines between the canal Dadinco and Nuble river, Aurelio said that "the last year I thought the Ñuble river was going to run dry because usually the river flowed through our Dadinco's bocatoma, However, the river was dry, like a fossil. I walked on the river stones with my shoes; there was no water ... and I said, *the river will become fossilized* here ... and I thought about it. It will become very difficult in the coming years"

⁹⁴ Interview conducted in Chillan, October 16 of 2014

In Colina, one of the communes most affected by the drought in the Maipo river basin, since *the last flood* of 1987 the situation is becoming more and more dry. In effect, the Colina river already is a fossil. Like Pirque and Curacavi's farmers, the irrigators from Colina are fully aware of the hydrosocial cycle in the basin. Reminiscing about the old notion of drought depicted by irrigators from colonial Santiago, Alfredo, the manager of the *Asociacion de Canalistas Colina* said that the drought is not only the lack of rainfall but also the lack of snow in the Andes Cordillera, "which strengthens the groundwater for deep wells". As the Colina river went completely dry during the 1990s, according to Alfredo, the farmers from the area also have been pumping water from their (deep) wells to irrigate their crops. Now, even these wells are drying out, which is also affecting the water for human consumption.

'Here we use to have good wells of around 80 meters deep that gave you 80 liters per second, and now a well of 120 [meters] gives you 45 liters per second. [We are] very critical, and here in Colina the thing is supremely dramatic because there are these people who do not have water to drink. They have their own wells to supply their neighborhood sector, which are committees of rural drinking water [APRs]. Well, they are worse because their wells are drying up and let me tell you one thing: The Santa Filomena sector [from the commune] has water only from 2 to 4 in the morning, and from 6pm to 8pm. The rest of the day [they have] no water''⁹⁵

⁹⁵ Interview conducted in Colina, December 5 of 2014

The systems of Rural Drinking Water (*Agua Potable Rural*, APRs by its acronym in Spanish) mentioned by Alfredo were created in 1964 by President Frei Montalva as a means to provide drinking water to rural populations without access to it. The APR program of water works can be considered as an integrated strategy to supplying drinking water to rural populations that since 1964 began to receive land and water shares from CORA as part of the agrarian reform. An APR is a deep well built in rural areas in which there is a semi-concentrated population of between 8 and 15 homes per kilometer of water network and more than 80 people (DOH, 2014). Currently, there are 1,729 APRs (deep wells) in Chile that supply drinking water to 1,635,900 inhabitants (almost 10% of the country's population) (DOH, 2014). These APRs are planned and constructed by the *Dirección de Obras Hidráulicas* (Hydraulic Works' Directorate), also known as the "DOH" by its acronyms in Spanish, a sub-agency from the Ministry of Public Works. Once constructed, the DOH transfers the APR management to the Cooperatives or Committees of Rural Drinking Water. Like the water user organizations, these are another type of self-organized water institution, in which peasants manage the APR through directives elected by the APR users. There are around 1,500 APR Cooperatives/Committees and 7,500 leaders that participate in the APR directives nationwide (Villarroel, 2012). This directive manages the APR and enforces the payments of monthly bills for the users (peasants and other inhabitants from rural areas), among others activities.

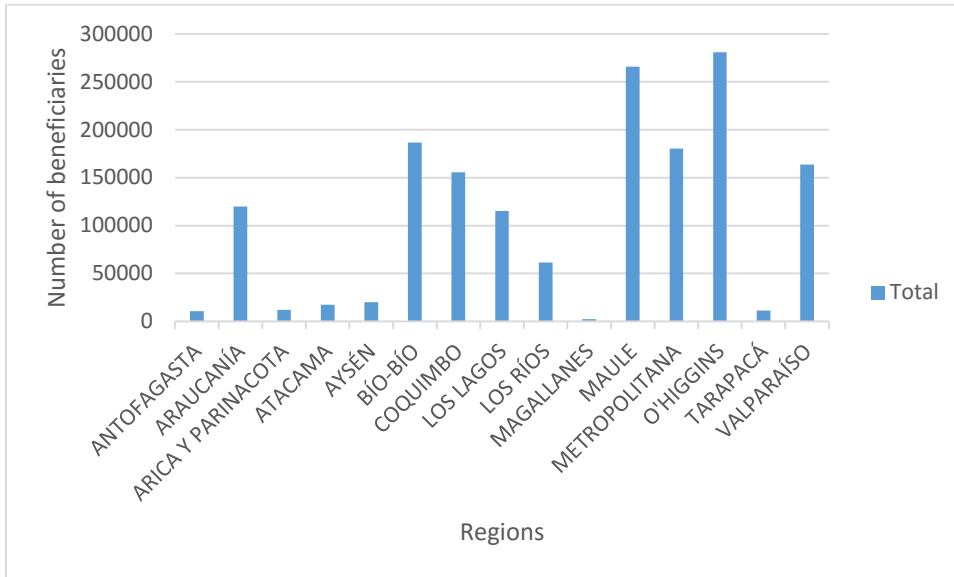
The APR Cooperatives or Committees can be considered a second type of water community management. The first type is developed by irrigators through their water

user organizations. While the APR Cooperatives/Committees are another type of collective project engendered by the process of agrarian reform (specifically since 1969 for the Cooperatives and 1976 for Committees), we have seen that the water user organizations (Juntas de Vigilancia, Asociaciones de Canalistas and Comunidades de Agua) date back to at least 1827. APR Cooperatives/Committees are oriented towards providing drinking water for peasants in rural areas as a non-profit service. Water user organizations are oriented towards providing water to irrigate agricultural production from a market based perspective. Importantly, APR Cooperatives or Committees collectively decide the water billing prices for their members according to the maintenance needs of the APR. According to my conversations with different APRs leaders from Santiago and Biobio, the bills paid by APRs users are much lower than those paid by users from urban areas, in which drinking water is completely supplied by water corporations⁹⁶. In this sense, the APRs hydrosocial systems are democratically self-organized by the community members, who control both their water sources and the prices that they pay monthly for the service.

In 2014, the Biobio region had 181 APR systems supplying drinking water to 180,651 persons, while the Santiago region had a total of 102 APR systems supplying water to 180,348 persons. These two regions represent 16.3% of the total amount of APRs in the nation, and 22% of beneficiaries (Figure 5.2)

⁹⁶ The main corporations controlling the urban water supply are “Aguas Andinas” for Santiago and “Essbio” for Biobio.

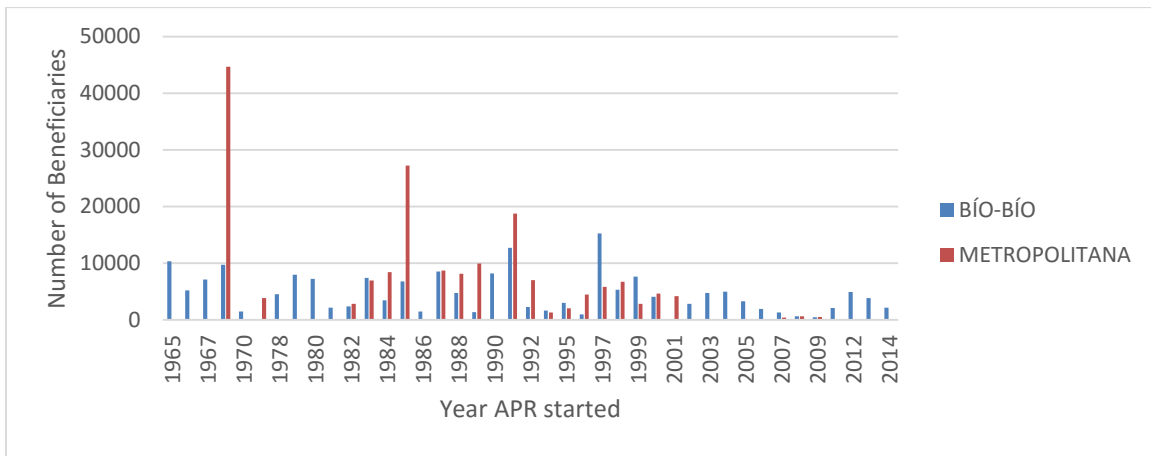
Figure 5.2 Number of beneficiaries of APRs in Chile according to region



Source: elaborated with data from the Dirección de Obras Hidráulicas (DOH) (2014)

In Biobio and the Metropolitan region of Santiago, the majority of these APRs were constructed during the 1980-2000 period (Figure 5.3). It is interesting to note in figure 5.3 that during the drought of 1967-1970, in Santiago, APRs were constructed to supply water to almost fifty thousand campesinos. As mentioned by Alfredo from Colina, these communitarian wells are also drying up and are leaving the rural populations without water in the northern area of Santiago. In the Nuble river basin, many of these APR deep wells are also drying up mainly because of forestry development.

Figure 5.3 Historical development of APRs in Biobio and Metropolitan Region of Santiago according to number of beneficiaries



Source: elaborated with data from DOH (2014)

In sum, the water market and the accumulation of large amounts of consumptive water rights by national and foreign corporations; the over-allocation of water rights by the DGA; the (now) ‘anthropogenic’ drought (as opposed to the ‘natural’ drought of the colonial days), and the overexploitation of both surface and groundwater by new and old geographical projects, have all created an scenario of growing hydrosocial metabolic rifts in Santiago and Biobio. As the above histories demonstrate, irrigators are being affected by this rift but their water user organizations have adapted to the growing water crisis, for instance through the “prorrato” and the growing extraction of groundwater through deep wells to irrigate their crops. All these socio-natural factors put pressure on aquifers. For these reasons, the water crisis is also affecting the small wells (*norias*) and the APR’s deep wells that supply drinking water for peasant communities.

In neoliberal hydro-modernity, campesinos serviced by the APR networks frequently divide their year working the harvest season as rural workers (*temporeros*) and the rest of

the year cultivating their own crops and raising some animals in small plots. Sometimes they own their own plots (many ex-CORA), but also many are land renters and sharecroppers, the latter of which is popularly known as *medieros*. In some way, the old geographical project featuring independent campesinos is still alive, but has many difficulties due to privatization and corporate monopoly power over natural commons such as water and land. Unlike the powerful large and medium size farmers commanding water user organizations, after the counter-agrarian reform, the campesinos' social power has been diminished at their very roots, gradually leaving them without land or water. They have been systematically separated from their direct access and control of their traditional land and water resources, having to be serviced by water trucks from the municipalities and regional governments. They are at the losing end of the hydrosocial metabolic rifts created and expanded by the current neoliberal hydro-modernity and (bad) development.

3. Water governmentality and the restoration of hydrosocial metabolic rifts: the 2014 water reform and political struggles around the private and public domains of water

In order to cope with and begin to restore these growing hydrosocial metabolic rifts, the Bachelet government began to implement water reform in 2014. This reform can be seen as a way in which the state, and specifically the Bachelet government (2014-2018), is assuming the moral and material responsibility of protecting people and water ecosystems from overexploitation, accelerated depletion and dispossession. In this sense, I argue that there is a growing governmentalization of the Chilean state triggered by the

growing water crisis⁹⁷. This means that the Chilean state is assuming a strong role oriented towards ensuring the continuation of conditions by which waterless campesinos can continue producing and reproducing their socio-ecological life. As water is essential for life⁹⁸, water reform can be seen as an initial attempt at restoring the multi-scale hydrosocial metabolic rifts produced by the coupled effects of the neoliberal hydro-modernity and climate change. In some way, the 2014 water reform is also the state's attempt to cope with the gaps in water governance created, in part, by the water re-privatization of 1980-81, and in part by the drought.

This purposeful state attempt to govern the rifts produced in hydrosocial metabolic processes are clear attempts at putting limits on capital. However, in a neoliberal regime of water management, capital does not like limits. The roll back of the state which was established firmly in the 1980 Constitution is frequently referenced by capitalists and economic elites grouped within corporate power. They argue that the Constitution is the main institutional barrier for deep hydrosocial change. They repeat that the Constitution cannot be violated every time that civil society and center-left political elites (who

⁹⁷ “The broadening scope of state interventions to ensure the health of populations, resources, and the economy, predicated on unprecedented techniques of surveillance and statistical representation, is what Foucault referred to as the “governmentalization” of the state. Of course, the process of governmentalization is historically and geographically contingent, inflected in some instances with colonial power relations, and later shaped by relationships with development banks and aid agencies, which have devoted significant financial resources to the creation and expansion of state agencies and departments charged with the provision of public services. Nonetheless, argue scholars like Anna Stoler, the process of governmentalization in many developing countries is necessarily incomplete [...] Access to goods and services is usually incomplete and is thus often a locus of political struggle”. Bakker, 2010, p.28-29

⁹⁸ This is not a “theoretical” essentialism but a “real, material or organic” essentialism

currently manage the state) try to intervene in public affairs that by them—national and transnational economic elites—are seen as exclusively private affairs. This is precisely the case of the current water reform, in which the state is proposing to put certain “limits” on the water markets and therefore, to the water rights holders such as irrigators and agribusiness, among others, all of which touch upon Pinochet’s Constitution of 1980.

What does Bachelet’s water reform consist of? According to my interview analysis, government documents (Delegacion Presidencial para los Recursos Hidricos, 2015), international institutions (Banco Mundial, 2011, 2013), and parliamentary documents⁹⁹, the 2014 water reform has been planned and displayed in three distinctive but interrelated strategic domains: legislative changes, water infrastructures, and institutions & governance (Chart 5.5)

⁹⁹ *Comision de Recursos Hidricos y Desertificacion* (Water Resources and Desertification Commission), Deputy Chamber, created in October 17 of 2012. See https://www.camara.cl/trabajamos/comision_portada.aspx?prmID=720

Chart 5.5 Main components of 2014 Water Reform in Chile

LEGISLATIVE CHANGES	WATER INFRASTRUCTURE	INSTITUTIONS & GOVERNANCE
<ul style="list-style-type: none"> ➤ ‘Old’ and ‘New’ Water Rights ➤ “Expiration” of water rights for non-use ➤ “Adjustments” of <i>legal</i> water rights to existing <i>ecological</i> water flows in river basins ➤ Public domain of water ➤ Constitutional changes ➤ Prioritization of uses ➤ Glacier Protection 	<ul style="list-style-type: none"> ➤ Hydro-Infrastructure to “<i>cover the emergency</i>”: water trucks, wells, APRs... ➤ Strengthening of APR Cooperatives ➤ Irrigation technologies: small and large reservoirs, canals... ➤ Strengthening of Water User Organizations 	<ul style="list-style-type: none"> ➤ Better coordination among state water institutions (44 agencies, 104 hydro-functions) ➤ Challenges for River Basin Management ➤ Gap of governance among basin stakeholders (State, Juntas de Vigilancia, Campesinos, Corporations, Activists, Scholars, etc.)

Source: elaborated from my interview’s analysis; Banco Mundial (2011, 2013); Delegacion Presidencial para los Recursos Hidricos (2015)

These domains or main components are far from covering all the problems and issues addressed by water reform. I have only highlighted the high points of interest for this chapter and dissertation. But even so, I think these are the water reform’s core issues. This is so because these issues are not the result of a single year’s assessment (2014). In effect, the Bachelet water reform of 2014 has been strongly influenced by the water crisis described above, which triggered the DGA and the Ministry of Public Works to request a study by the World Bank in September of 2010. The objective was to request support to formulate a future National Water Policy for the country. The study outcomes were released in a report written in Spanish in March of 2011 (Banco Mundial, 2011) and

submitted to the Chilean Government under the presidency of Sebastian Pinera (March 2010-March 2014).

In the 2011 report, the World Bank focused mainly on the problems and challenges around the domains of *legislative changes* and the need of *new institutions* oriented towards fixing the problems of water governance currently existing within and among public-private water institutions at the river basin and national scales. Regarding the legislative changes, the World Bank concluded that one of the main challenges is to “protect the water rights of vulnerable groups” (Banco Mundial, 2011: 64). This points out the already mentioned fact that many ex-CORA peasants and other small farmers have not registered their water rights titles. The “regularization” means to register ones water rights in the *Conservador de Bienes Raices* (Real Estate Registry), which in practice confers the water right holder the legal title of private property over his or her water rights. In many cases, the original water rights holders (campesinos) have passed away, many of them without leaving a will specifying the inheritors of the water shares, which is one of the necessary steps to registering in the real state registry.

In relation to the institutional challenges, the 2011 World Bank report mentions the need to strengthen the DGA and Water User Organizations, and recommends better coordination among “fragmented” and “disconnected” state water institutions (Banco Mundial, 2011: 66). In addition, the World Bank report makes general suggestions to “integrate the river basin management and to promote participation of stakeholders” (Ibidem, p. 67). These institutional issues were further developed in a second study requested by the Pinera’s government in 2012 of the World Bank. The report was

published in 2013 (Banco Mundial, 2013). This study concludes that there are “more than 40 institutional actors responsible for executing more than 100 functions within the water sector” (Banco Mundial, 2013: 89). The report states that some of these 43 state water institutions (e.g. DGA, DOH, INDAP, and so on) are involved in the same function, generating an overlapping and duplicity of functions¹⁰⁰. For instance, in the macro-function referred to as “Design, construction, operation and maintenance of water infrastructures” there are at least 8 state institutions involved (Banco Mundial, 2013: 35). For instance, it includes the DOH with the APRs, and the CNR (National Commission for Irrigation) with irrigation infrastructures. In other cases, there is “weak coordination in the performance of complementary functions”, and finally, there are also “gaps in the execution of some functions” (Banco Mundial, 2013). For these reasons, the World Bank report proposes actions oriented to creating institutional arrangements to fill these gaps.

The relevant point is that the actions proposed by the World Bank to improve the coordination at the state water institutions are grouped in a continuum from the easiest to the most difficult to implement. First, the report proposes easy actions that can be done

¹⁰⁰ In the report, the 104 functions identified by the World Bank were grouped into 11 macro-functions, in turn grouped into four main themes. **Theme 1: Water Resources Management.** Macro-functions: 1) Operation of the systems of information, communication, science and technology of water; 2) Formulation and monitoring of water plans and policies; 3) Managing water rights and their markets; 4) Prevention and Emergency Response. **Theme 2: Development of Water Resources.** Macro-Functions: 5) Design, construction, operation and maintenance of water infrastructures; 6) Water works and improvements in natural streams and river sand’s exploitation. **Theme 3: Inter-sectoral, social and financial coordination.** Macro-functions: 7) Inter-sectoral coordination and socio-environmental objectives for water resource management; 8) Participatory instruments for water resource management; 9) Economic instruments for water resource management. **Theme 4: Monitoring and Legal Actions.** Macro-Functions: 10) Audit and control; and 11) Legal actions. Banco Mundial, 2013.

“within” the current institutional framework based on the 1980 Constitution and 1981 Water Code, strengthening the DGA capacities. Second, the World Bank proposes actions that require modifications to current laws and regulations, the main proposal being the creation of a new agency—a Sub-Secretary of Water Resources or a National Water Agency—that would be capable of coordinating the 43 state water institutions. Third, the World Bank proposes transformative actions that involve re-allocating functions and roles among these state water institutions, which implies deeper legal changes.

The latter seems to be the pathway undertaken by Bachelet. In March 28th of 2014, the Bachelet government nominated a “Presidential Delegate of Water Resources”, a position designed especially to prepare the water reform. This decision was made during her first month in office, and it was the answer to a promise made to environmentalists, NGO’s and civil society groups that had supported Bachelet in her presidential campaign, but was also strongly influenced by the World Bank assessments of 2011 and 2013, in addition to the different conclusions made by the Water Resources and Desertification Commission from the Deputy Chamber. All these initiatives have been trying to understand and organize the different problems arising from the material processes of water dispossession and hydrosocial metabolic rifts exemplified by the growing agricultural emergencies, emergency drought zones, peasants without water, and the growing protests and water movements emerging throughout the country (chapter 6). The person chosen by President Bachelet to fulfill the position of Presidential Delegate was Reinaldo Ruiz, an engineer and Ph.D. in Economics from the University of Birmingham (UK), a faculty member of the University of Talca, and a man who also had

previous experience as a public official during the first presidential period of Bachelet (2006-2010). For instance, Ruiz was the Director of the *Oficina de Estudios y Políticas Agrarias* (ODEPA) [Office of Agricultural Studies and Policies] (2006-2008) and Sub-Secretary for the Ministry of Agriculture (2008-March 2010) (Ministerio de Agricultura, 2014). In turn, this Presidential Delegate nominated sub-delegates (coordinators) for each region of the country, considering the strong differences in the water crisis among and within the sixteen regions of the country, from the arid Atacama Desert to the rainy Patagonia.

When I began my fieldwork in the Biobio region in August 2014, I was able to observe how the Biobio coordinator, Adrian, a young political scientist, was developing different activities to coordinate different state water institutions from this region in order to make a regional assessment¹⁰¹. This regional report, in turn, was going to be incorporated as a regional input in the new National Water Policy. The Presidential Delegate's coordinator for Santiago, Abigail¹⁰², an experienced engineer, also commented during our interview that she was organizing the Santiago regional assessment for incorporation into the new National Water Policy. This was finally published by the Chilean Government through the Ministry of Interior in January 2015 (Delegacion Presidencial para los Recursos Hidricos, 2015). In sum, the water reform of 2014 has received national and regional inputs, but also global inputs through institutions

¹⁰¹ Interview conducted in Concepcion, September 5 of 2014

¹⁰² Interview conducted in Santiago Centro, December 3 of 2014.

like the World Bank. The coupling of all these multi-scale processes has been producing political-ecological effects in the Chilean hydrosocial process on both regional and national scales.

Legislative changes

Based on the World Bank reports, the Bachelet government's water reform begins from a theory that, nationwide, there are at least 10% of "New" water rights still available to be allocated by the DGA. According to public officials, farmers and water experts, this number is contestable because the country's geography shows that this 10% is almost completely available in Austral Patagonia, which is far away from the central and northern regions in which water scarcity is much more marked. Under this assumption, Bachelet's water reform proposes that in the future, the state (DGA) will be able to allocate water from this 10% for a maximum of 30 years. Once this term expires, water rights will be able to be renewed. However, this renewal will be conditioned on the fact that the water right holders must demonstrate that, once having reached the 30 years, they have been productively using their water rights. If so, they will get the approval for renewal from the DGA. This action radically changes the current situation based on the 1981 Water Code, in which water rights are allocated in perpetuity and that they are "protected" by the 1980 Constitution. This article in the Constitution (19, number 24) was a clear response to the expropriation without compensation of water during the agrarian reform and the 1967 Water Code. Today, the most important political struggle over water in Chile is precisely this article in the Constitution, because the Bachelet

reform proposes that water must be a public good at the Constitutional level too, not only at the level of the Water Code, as it has been until now.

Irrigators organized at the level of the Juntas de Vigilancia and the National Confederation of Water Users oppose to this change. They argue that water already is a public good (in the Water Code) and that they need to have the legal security that they are going to “use, enjoy and dispose” of their water rights freely and without any limitations made by the state, as is established in the Water Code and protected by the Constitution. For irrigators, the current system based on water markets has brought “economic prosperity”, “legal security”, and therefore “it works very well” for them¹⁰³. Any change will eventually be to their detriment as farmers because their investments in their estates depend on the legal security of water property rights that they obtained in the (authoritarian) 1980 Constitution. Irrigators fear that if Bachelet’s proposal of “water rights with an expiration date” is approved, they will have to renew their water rights and this situation, according to them, will “subject them to the arbitrariness of public officials”, because public officials are “highly vulnerable to corruption”. For instance, some irrigators argue that public officials could eventually prefer to re-allocate water rights to corporate powers, who could use their privileged power positions to “bribe” public officials in order to receive the (available) water rights. This could eventually be to the detriment of other powerless actors, such as campesinos and other waterless people. If one thinks of future scenarios of heightened water scarcity and therefore intensified water

¹⁰³ Seminar “Reforms to the Water Code: the vision of Water User Organizations”, organized by the Law School of the Catholic University of Chile. Santiago, December 2 of 2014

struggles, this reasoning could be perfectly feasible. However, I think that this critique can be prevented with stronger regulations and monitoring of public officials. This is an issue of strong institutions, rules, and surveillance of everyone: public officials, corporations, irrigators, and so on. However, this first action in the whole strategy of Bachelet's water reform would be applied only to the 10% of the (theoretical) new water rights still available in the Chilean river basins.

The other 90% of "Old" water rights already allocated will not "expire" in 30 years because they were already allocated in perpetuity under the 1981 Water Code. In spite of this, Bachelet's government argues that many of these water rights already allocated under the current private property system are being misused. Many private agents, mainly large corporations, have accumulated large amounts of water rights, but many of them do not use these water rights for what they said they were going to use them for when these rights were allocated by the DGA. Instead, they are speculating with these water rights, selling them to the highest bidder in the water market in order to profit from water received for free from the state. This is one of the main perversities of the water market set to be eliminated by the water reform. In these cases, the Bachelet water reform argues that water rights that are not being used for the productive purposes for which they were allocated will "expire" (*caducar*) automatically. Then, these water rights will be taken back by the DGA, becoming available to be allocated to other people who need them in the future.

Irrigators oppose this action too because evidently it goes against the 1980 Constitution because the “*expiration*” of water rights for non-use means that the state would be “expropriating without any compensation” the water rights that have been allocated in perpetuity. According to irrigators, this policy means a literal “confiscation without any compensation” (Asociacion de Canalistas de Pirque, 2014). Here is where the Bachelet’s water reform clearly shows that the reform is a deep struggle to restore water to the public domain by disassembling the entire water market system installed under the neoliberal hydro-modernity. The reform seeks to reassemble the water market in a new historical-geographical form, which is still diffuse, but in general terms it is oriented towards changing the “value” assigned to water, enhancing its use value for society instead of its exchange value for the market. In any case, in the broad picture it seems very difficult to eliminate the water market completely, but at least the reform is seeking to put serious limits and regulations on this hydro-market.

Another proposal in the Bachelet water reform that is also oriented in that direction aims to make “adjustments” between the “legal” water rights and the “real” or existing ecological flows of river basins and aquifers. This policy is also controversial and strongly resisted by irrigators. As I described above, it is very common that in some river basins the amounts of “paper” water rights are much higher than the “ecological” flows really existing in rivers basins, in terms of both the surface and groundwater. To face this issue, traditionally irrigators have used the “*prorrrateo*” system to adapt (see above). Nonetheless, in this case the Bachelet water reform argues that the state is going to undertake an “adjustment” to fill this gap. As I described above, many farmers have

large amounts of theoretical water rights to irrigate, for instance, Benjamin, a large farmer from Curacavi has water rights to irrigate 600 hectares, but in practice he is irrigating only 45. For the Bachelet water reform, the distance between paper water rights and ecological flows are an *artificial situation* that is also giving space for speculation and misuse of water rights. For instance, what would happen if a large farmer like Benjamin decides to sell all his water rights? The buyer would expect that they are allowed to irrigate the 600 hectares, but in practice that is not going to happen. For this reason, if a water right holder has is registered for 50 water shares but the river or aquifer is providing only 20, the Bachelet water reform will review his or her file, “adjusting” the 50 shares to 20 water shares.

As every water share has a price (economic value) in the water market, for irrigators this means an expropriation without compensation, which means a loss of capital. In a letter submitted to the Water Resources and Desertification Commission of the Deputy Chamber in the context of the observations to the water reform, the historical leader of the Confederation of Canal Users of Chile, Fernando Peralta, argues that these “adjustments” between abstract and material water “will result in a capital loss for more than 300,000 owners of water rights within the agricultural sector, the vast majority with properties under 10 hectares. The capital of mining companies, farmers' irrigation, water corporations and some industries also will be reduced” (Peralta, 2014: 4).

The point is controversial because irrigators argue that they use this “water capital” (water shares) as a strategic input in their commercial relations with the banks. In neoliberal hydro-modernity, water shares are collateral for bank loans requested by

farmers. Irrigators argue that if they do not have their water's private property rights, their properties (from large estates to small plots) will be "depreciated", losing their market value. This was a strong argument made by Benjamin, a key informant, large farmer and lawyer from Curacavi (Santiago Region), during our interview. He said: "Here in Curacaví the irrigated hectare costs \$30 million [around US\$43,000]. If your water shares are removed, it would cost \$1 million per hectare [around US\$1,500]". In this case, the bank probably would decline to make a loan to Benjamin, a farmer whose property has lost its value due to the "adjustments" made by the water reform. At best, farmers will get "adjusted" loans according to the land value, highly depreciated due to the adjustments made to their paper water rights based on existing water. Public officials, particularly the Santiago coordinator for the presidential delegate, argue that this issue is important and it will have to be addressed by the reform, but "the bank will also have to adjust to the new policies and adapt" to the new configuration created by the water reform. This would mean that in the future the banks won't be able to put water shares as collateral for their loans to (large) farmers.

In sum, the legislative changes proposed by the Bachelet water reform, particularly the figures of "expiration" for non-use and "adjustments" of water rights to the hydrological reality of river basins, means changing the controversial article in the 1980 Constitution. In turn, this change points out the fundamental change: the Constitutional recognition of water as a "public good", that is, as a use value that eventually will not be able to be freely transferred in the market as a private property as it has been until now. This is the core issue resisted by irrigators, particularly large

farmers. What Bachelet's water reform is proposing is that irrigators and other water rights holders will be able to continue "using and enjoying" their water (use value), but they will not be able to "dispose" of them as private property. The latter condition allows them to sell the water, rent it, and inherit, etc., just as any other real estate commodity with an exchange value. In other words, Bachelet's water reform is highlighting the deep contradictions between water having an economic value for market and profits, and water having a use value for the human needs of society.

If water is being reoriented to satisfy social needs and the general "public interest", irrigators criticize that the reform does not define a precise concept of the "public interest", and that according to them, it is the main assumption of the complete reform. For instance, for the National Society for Agriculture, in the Bachelet water reform the "public interest" is an "*abstract, indeterminate, indefinite, vague, and therefore eminently ideological concept*". According to the irrigator's rationality, "It is assumed that this concept of 'public interest' should be the summary of principles, goals and objectives of political and/or legal nature building the fate that you dream for a nation. But in this case, it is a nation represented by the state or rather by its government. It is here wherein its ideological character becomes important because this concept [public interest] has always been used for manipulation and arbitrariness of authority" (Sociedad Nacional de Agricultura, 2014: 4)

For irrigators, the Bachelet government has failed to define the "public interest" in relation to the water reform. However, in this case the "public interest" is clearly

oriented to going to the rescue of the communities of peasants without water and to slowing down the overexploitation and destruction of whole river basins, such as Maipo. In this sense, the new National Water Policy explicitly states that one of the most important dimensions of the “public interest” is the “difficulties observed in many community’s access to water for human consumption” (Delegacion Presidencial para los Recursos Hidricos, 2015: 9). For this reason, I think that the “public interest” claimed by irrigators could be understood as the way in which the state, representing the collective interest of all the social groups in the nation, is trying to solve public problems for the benefit of excluded social groups, problems that private agents like the irrigators will never solve because they mean large investments in both infrastructure and institutions. Specifically, there is no interest in public investment for no profit. In the last part of the quote, the National Society for Agriculture mentions that the notion of public interest has always been “used for manipulation and arbitrariness of authority”. They are likely recalling the expropriations made by the state at the end of the 19th century with the canalization of Mapocho and the modernization of Santiago city, but mainly the most recent water expropriations made during the socialist hydro-modernity project led by Salvador Allende (chapter 4). In each one of these historical periods of social change, there were strong reasons to impose the public interest over the private ones (provide potable water for poor people, agrarian reform). The current hydrosocial configuration produced by the neoliberal hydro-modernity is newly calling for imposing the public interest over the private one. Now there are also strong reasons: restore the hydrosocial metabolic rifts produced by neoliberal development.

Water infrastructures

For this reason, one of the most important actions included in the Bachelet water reform is to cope with the “water emergencies” created by neoliberal hydro-modernity. Here the governmentalization of the state in water affairs is much more clear and material because it includes the quantification of people without water at municipal and regional scales, in order to calculate the amounts of investment to be made in different water infrastructures such as APRs, wells, and the territorial deployment of the water truck system to quench the growing thirst of the Chilean populations being dispossessed of their water resources. This water truck system responded rapidly to the water emergency, but at high economic costs of around US\$4,5 million per month (Delegacion Presidencia para los Recursos Hidricos, 2015: 44). However, this public investment is completely necessary because according to official data (2014), around 400,000 peasants and inhabitants of rural areas are being supplied by water trucks since 2010 (Delegacion Presidencia para los Recursos Hidricos, 2015: 44), the “breaking point” year in which this national scale hydrosocial metabolic rift began. These hundreds of thousands of persons are the representation of this “public interest” claimed by the irrigators and the National Society for Agriculture. Around 45,000 of these waterless people are from the Metropolitan Region of Santiago, and almost 50,000 are from Biobio (Delegacion Presidencia para los Recursos Hidricos, 2015: 44).

However, to cope with the water emergency is not only to focus on peasants without water but to also include the agricultural emergencies described above. For this reason, the Bachelet water reform also includes large public investments in irrigation

infrastructure of both small and large scale. In this point, I think it is important to highlight the differences between the two types of water community management already mentioned, one represented by the campesino's APR Cooperatives/Committees and the other by the irrigators' water user organizations. These two forms of water community management show important differences in relation to the democratic forms of water governance already existing in Chile at the community level. On the one hand, APR communities manage their own drinking water, and as I mentioned, they choose their directive members democratically, that is, one person, one vote. On the other hand, irrigators' communities manage their own irrigation water, and as I mentioned in chapter 1, they chose their directives according to the quantities of water shares they own. One water share, one vote. One hundred water shares, one hundred votes. As the water shares are highly concentrated in large farmers and agribusiness, in this institutional framework the campesinos do not have any possibility of integrating themselves in the directive of the Juntas de Vigilancia, and although many of them manage their own Comunidades de Agua (Water Communities), these communities are often minority water shareholders in their respective Asociaciones de Canalistas and Juntas de Vigilancia.

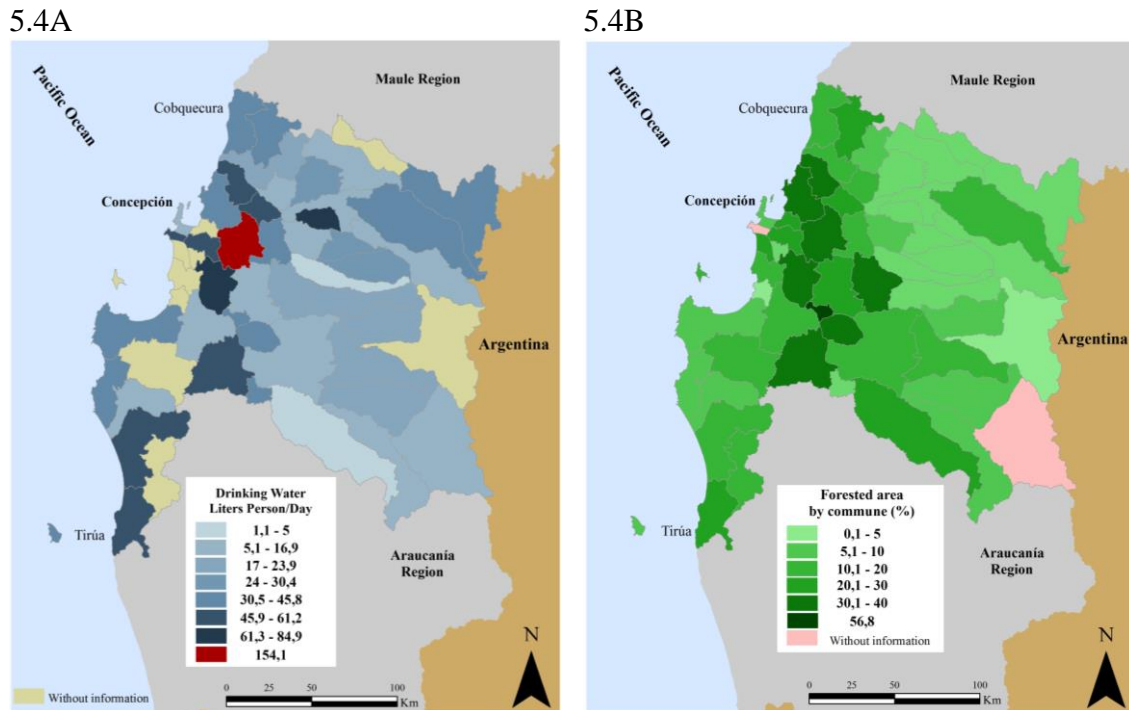
There are two opposed logics operating here. One more democratic, associated with the APR Cooperatives/Committees, and the other non-democratic, associated with the irrigators' water user organizations. It is interesting to note that the democratic form of water community management associated with the APRs is oriented to provide water for human consumption. Meanwhile, the non-democratic form of water community management associated with the water user organizations is oriented to provide water to

irrigate the capital invested by farmers in their crops. This applies from the modest sharecropper and renter campesinos to the large farmers and agribusiness, although their socio-spatial scales are different because campesinos own much less land and water shares than large farmers and agribusiness.

In any case, both are targets to be serviced by the state through different programs to “cover the emergency” of water shortages produced by the hydrosocial metabolic rifts of development. In my ethnographic fieldwork I observed that these state tasks have not been easy. For instance, for the APRs and the campesino wells that have dried up, public officials have not found “easy replacements” because it is not simple to find another aquifer once the old one has dried up. In Biobío this situation is particularly acute under the context of the dominant landscape of pines and eucalyptus associated with forestry development, but also affected by the 2010 earthquake which disrupted water flows already known by local people in existing aquifers. However, that is only a partial explanation because there is a growing consensus among water subjects (the state, irrigators, and campesinos) that not only the drought but also forestry development are the main drivers of the hydrosocial metabolic rift expressed at a regional scale (Figure 5.4)¹⁰⁴

¹⁰⁴ This analysis is based on Torres et al, 2016, pp. 131-133

Figure 5.4. Water shortage¹⁰⁵ and surface covered by forestry plantations according to communes, Biobio Region



Source: Torres et al, 2016, p. 131

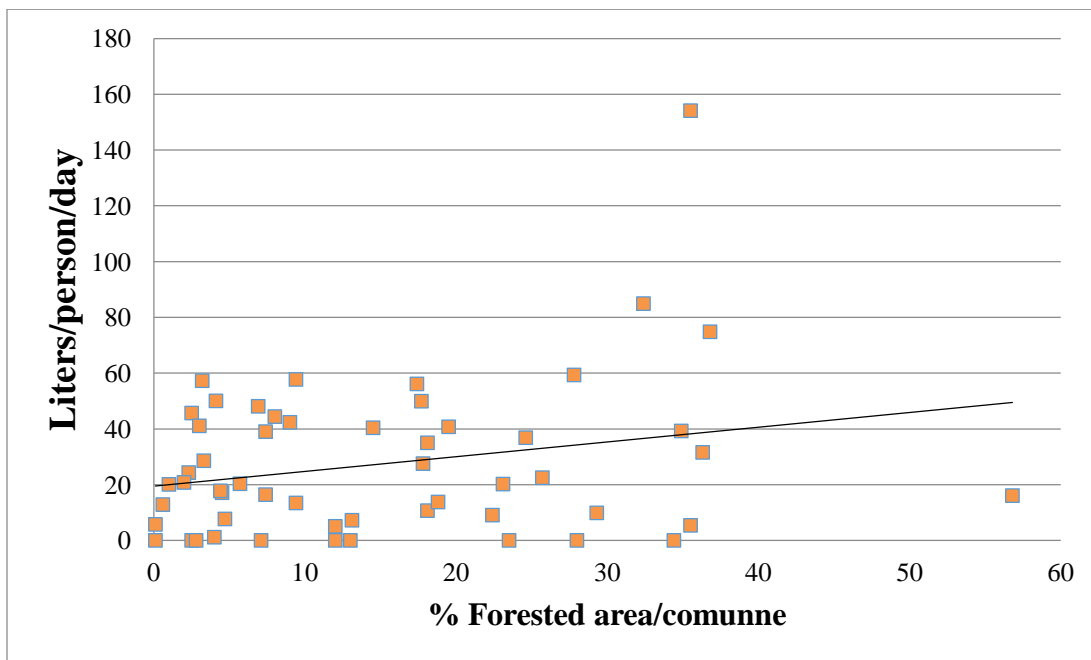
Figure 5.4A shows the average value of drinking water that was distributed daily per person (liters/person/day) by water trucks for the September 2013–May 2014 period in the Biobio region. Darker areas indicate a higher level of water distribution to the populations affected by the water shortage (with a maximum value of 154.1 liters/person/day), while lighter areas indicate a lower level of water distribution (with a minimum value of 1.1 liters/person/day). Information is presented for the majority of the 54 communes in the Biobio Region. The highest water distribution figures are observed

¹⁰⁵ For this analysis, "water shortage" is considered to be equal to the average amount of water per person distributed each day.

in communities located in the dry lands of the coastal cordillera. In this analysis, it is assumed that higher levels of water distribution by water trucks reflect a condition of greater water scarcity affecting the benefitting rural population. In effect, greater volumes of water are associated with higher demand and consequently with more severe water scarcity. It is also possible that variations in demand for water is associated with the economic and management capacities of municipalities and ONEMI. Nevertheless, Figure 5.4 shows clearly that in rural areas of the coastal cordillera, where the communes have higher percentages of their surfaces covered by forestry plantations (5.4B), a greater quantity of water was distributed per inhabitant (5.4A), which indicates more severe water scarcity and therefore greater demand for the municipal water truck systems.

As a way to demonstrate the relationship between water shortage and forestry development, the variable “percentage of forested area per commune” (Figure 5.4B) was related to the variable “liters/person/day” (Figure 5.4A). Figure 5.5 presents the results, where it can be observed that there is a positive and linear correlation ($r=0.43$) between the two variables. This means that the larger the forested area per commune, the greater the average of liters per person per day of water distributed by the trucks to peasants dispossessed from their traditional water sources. The relationship between forestry development and water shortage is evident statistically and socio-spatially.

Figure 5.5. Relationship between forested areas and water shortage according to communes, Biobio Region



Source: Torres et al, 2016, p. 132

Although implicit, Figures 5.4 and 5.5 also show that water scarcity is unequally distributed among urban and rural users in the Biobio Region. In urban areas water consumption was between 200 and 250 liters per day per person and there was no indication of a water shortage given that large private corporations (mainly Essbio) remained responsible for supplying drinking water through the large-scale infrastructure for urban water provision in the main cities (Concepcion, Chillan, Los Angeles, Talcahuano). As Figure 5.4 shows, the highest levels of water shortage and demand were in rural areas along the dry lands of the coastal cordillera, which are highly eroded areas reforested with plantations of pine and eucalyptus (Huber et al, 2010, chapter 3). These plantations affect the availability of ground water, an important source of drinking and

irrigation water for communities of peasants and Mapuche groups. These communities are mainly provided water through small-scale and artisanal infrastructures of water supply systems, such as the previously mentioned small wells, *norias*, *punteras*, and APRs (Torres et al, 2016: 132-133)

In Santiago, the hydrosocial situation is also made problematic by the fact that the whole river basin has been declared a restriction area, but also because the Maipo river basin is where the transactions of water shares are more dynamic. For instance, between 1980 and 2013, in the Metropolitan Region of Santiago there were a total of 41,437 water rights transactions that represent 34% of the national water rights transactions (n=121,896) made for the same period. In this period, in Biobio there were 8,707 transactions or sell/purchases of water rights, which represent 7.1% of the national transactions (Delegacion Presidencial para los Recursos Hidricos, 2015: 31). One revealing piece of data about the neoliberal hydro-modernity is that the 121,896 water rights transactions made nationally between 1980 and 2013 contrast radically with the 1,149 transactions made before 1980. The recent period 2006-2013 concentrates 60% (n=72,983) of all the water share transactions made between 1980 and 2013.

This coincides with the 2005 Water Code Reform. Ironically, that reform seems to have reinforced the water market instead of limiting it, spreading instead of stopping the hydrosocial metabolic rifts. In effect, the main innovation of the 2005 Water Code Reform (fees for non-use of water rights) created economic incentives for the corporations, who even request monthly that the DGA issue the billing for the payment of

the fees. Emiliano, a public official from the national office of the DGA in Santiago explains this water market failure as follows: “People understand that if you pay the fee there is a fund that goes to the state and that is not correct. It is a fund that favors the company, which every year discounts it as a tax burden, because once the company has made the fee payment it ultimately retrieves it. This is the law and people do not know it. What happens? [First] the fee is deducted from the taxes paid by the company. And second, when the company get its tax returns from the state, they get it back in UF [*Unidades de Fomento*, Units of Account]. In other words, the state does not ‘depreciate’ the money that the company paid as fees for non-use. So much so that there are companies that have water rights, they do not use them, and by their own willingness they inform to the DGA to be charged with the fee. The best proof that it is a business. The fee was thought up as a limitation to the property right over water, but it ended up being a business”¹⁰⁶

Overall, water market failures like the corporation’s profits generated by the fee for non-use of water rights, and the economic activities such as forestry and pork industry overexploiting river basins, have contributed meaningfully to producing agricultural emergencies, decrees of zones of water scarcity by drought, peasants without water, and the environmental degradation of water ecosystems. In sum, widespread hydrosocial metabolic rifts have occurred at different river basin and regional scales in the country.

¹⁰⁶ Interview conducted in Santiago Centro, December 10 of 2014

In this sense, public infrastructure planned for restoring the hydrosocial metabolism in a more sustainable way are among the main goals of the Bachelet water reform. This restoration of the hydrosocial metabolism means the normalization of continuous water provision for current peasants without water, and the implementation of irrigation technologies, such as improved canals, small and large scale reservoirs for accumulating water, and so on, in order to give water security to agricultural activities. The normalization and improvement of the water supply for human consumption and irrigation through new public water infrastructures is closely related to the social organizations and institutions governing these networks of water subjects involved in the process.

The water truck system (*abastecimiento de agua con camiones aljibe*) is seen by all the actors involved (regional governments, Ministry of Public Works, Ministry of Interior, ONEMI, municipalities, communities of peasants without water, truck drivers, and others) as a “temporary water policy” to cope with the water emergencies that have appeared during the last decade. Therefore, this temporary water truck system cannot be seen as a model of water community management, although in a certain way it is a (forced) way to collectively organize and manage the water emergency by a multiplicity of public and private actors. Perhaps this forced water management system can provide some lessons for future forms of social organization of water governance in some regions and municipalities. In this respect, I observed uncertainties among regional public officials in both Biobio and Santiago regarding how long this water truck system will last. Nobody would put an exact date for when the *normal* water provision for rural

communities will be completely restored because every day the population without water grows larger, the drought is extended, and the water market still operates freely without any regulations.

In this context, on the one hand there are APRs Cooperatives/Committees that emerge as an egalitarian and artisanal mode of water community management. It is a very interesting form of local water governance but not the dominant one, even considering the important number of population that they represent: 1,635,900 persons have benefited nationally (DOH, 2014). On the other hand, there are 280,484 agricultural producers or farmers registered by the National Agricultural Census of 2007, with the majority of them owning water shares to irrigate the 1,093,812.91 irrigated hectares existing in the country¹⁰⁷. As I have discussed in chapter 4 and this chapter, these irrigators are powerful and well organized, and they possess a traditional, hierarchical and market-oriented mode of water community management. I think there are interesting lessons to explore in future

¹⁰⁷ 57,567 agricultural producers are located in the Biobio region and 11,746 in Santiago. The producers from Biobio own a total of 1,790,901 hectares, of which 166,455.21 are irrigated lands, while the producers from Santiago own a total of 1,136,260 hectares, of which 136,732 are irrigated lands. In both regions a minority of legal persons (*persona juridica*) own the larger amounts of land. For instance, in Santiago only 1,704 legal persons (14.5% out of the total of agricultural producers) own 644,853 hectares (56.7% out of the total of regional agricultural lands), with an average of 378.2 hectares per legal person, in contrast to the average of 48.9 hectares per natural persons (*persona natural*). In Biobio, 909 legal persons (1.6% out of the total of agricultural producers) own 413,665 hectares (23% out of the total of regional agricultural lands), giving them an average of 445 hectares per legal person, in contrast to the average of 24.3 hectares per natural persons (*persona natural*). In some way, these official statistics confirm the high concentration of the land holdings in the Metropolitan Region of Santiago and the popular and middle agrarian classes' composition in Biobio (see chapter 4). Finally, it is clear that in Biobio one of the main legal persons is the forestry industry and their main corporations such as Forestal Arauco and CMPC. In Santiago, the legal persons are mainly agribusinesses who specialize in fruits but also the pork industry and other crops for exports. Institute of National Statistics (INE) (2007) Cuadros 4 and 5 [Charts 4 and 5].

research regarding the APRs Cooperatives/Committees in relation to democratic modes of water governance, which contrast with the water market oriented approaches historically practiced and currently defended (and promoted) by water user organizations.

Institutions and governance

However, the egalitarian/artisanal and hierarchical/technological modes of water community management represented by APRs and water user organizations, respectively, are only two forms of water management in a broader spectrum of stakeholders, flows of interests, and social power relations existing among water subjects at the river basin and national scales. The World Bank reports of 2011 and 2013 demonstrate that the state has many internal problems in their effort to create good institutional performance among public water institutions. Based on these reports, the Bachelet water reform also highlights the gaps of coordination among state institutions, but the water reform does not propose any plan to improve the water governance between the state and other river basin stakeholders such as peasants, irrigators, corporate power, indigenous people, and environmentalists. It seems to be that the democratization of water governance oriented towards domesticating the water market failures is conditioned on the legislative changes to the Constitution, which are uncertain as of the moment of this writing, March 2016. These Constitutional changes would eventually empower the state by granting it ownership of the property of water rights, which in turn could allow it to have the necessary power to evoke and lead a new process of water governance at the river basin and national scales under a new model beyond the dictatorship of the water markets.

I am not saying that the water market must be eliminated completely. I am fully aware that it is difficult to remove the status of commodity from water once this status has been created (see Bakker, 2010: 218-227). I am just imagining a post-neoliberal model in which the state, market and communities can interact in democratic manner and in a sustainable way, beyond the non-democratic and un-sustainable institutions created by neoliberal hydro-modernity. As stated by Karen Bakker, a water governance model controlled completely by the market is misleading, as it would be one oriented completely to the state or community management (Bakker, 2010: 220-221). The issue is to find out and implement an equilibrium among them, not a dictatorship of one of them above the others, as the Chilean case demonstrates. For these reasons, in the current process of water struggles around the Bachelet water reform, it has become evident that the different cultures and modes of social organization of the multiple water subjects involved in the process (peasants, irrigators, state, corporations, indigenous, and environmentalists) have conflicts between them, but these conflicting relations are perhaps the opportunity to figure out divergences and convergences for the future.

My analysis is that the hierarchical and market-oriented mode of water management practiced by irrigators' water user organizations diverges from and is trying to "colonize" the other water subjects, such as the state and APRs Cooperatives/Committees, who are not guided by the market goals of profit but rather by the social needs of people. In the ongoing water struggles around the Bachelet water reform, the scalar politics of traditional irrigators has been trying to defend the water market model, but at the same time they are trying to transfer this model, political agenda

and goals to other stakeholders, some of them being new water subjects who have emerged during the last decades of extreme experimentation of socialist and neoliberal hydro-modernity, who do not have the same political agenda nor social values. They are not oriented by the dictatorship of the water markets! The best examples are the campesino's ex-CORA and APR communities. The irrigators defense of the water market system based on private ownership of water rights is thus not only one of the main barriers to the Constitutional changes involved in the water reform, but also an important impediment for improving gaps of water governance among the different water subjects participating as water users at the river basins. Here is where the name of "water users" instead of "irrigators" mentioned above becomes relevant. Irrigators seem to want to lead the process of water reform at the level of water management in river basins in which they have, evidently, much more experience than many public or other private agents. However, they want to do so by transferring their market logic to the other actors. It is not surprising that the other actors, mainly campesinos and environmentalists, react negatively to and reject these attempts to be colonized.

Irrigators blame the state for wanting to nationalize their waters, but the state blames the irrigators for slowing down a necessary institutional change to governing the hydrosocial cycle in a more democratic and sustainable way. By the irrigators' rationale, their system based on water user organizations by which they have managed their water and canal networks since the 19th century is an "excellent" model of water management, one that is effective and that works well for them, therefore changes proposed by the

water reform are not necessary¹⁰⁸. They agree that public institutions must give priority to the supply of drinking water to the rural populations¹⁰⁹, but they argue that this public provision of water has nothing to do with the “hidden left-wing attempts” to dismantle the current model of private property over water rights. Irrigators argue that the water emergency can be resolved without changing the Constitution. They have even proposed to help to cope with the water emergency by integrating the APRs and other stakeholders as water shareholders into their organizations¹¹⁰. I think this would mean reducing the egalitarian, socially-oriented and democratic mode of community water management of APR Cooperatives/Committees to the hierarchical and market-oriented mode of water

¹⁰⁸ Seminar “Reforms to the Water Code: the vision of Water User Organizations”, organized by the Law School of the Catholic University of Chile. Santiago, December 2 of 2014

¹⁰⁹ In effect, the “prioritization of water uses” was one of the first amendments to the Water Code approved by the parliament in January 2015. According to it, the hierarchy of water uses will be, first, human consumption; second, eco-systemic conservation; and third, productive activities. Importantly, this amendment established that water for human consumption cannot be used for other purposes, like irrigation. *El Ciudadano* (2015)

¹¹⁰ Elsewhere in the country, several Juntas de Vigilancia are undertaking experimental water governance processes by integrating other corporate power such as hydropower and mining into their water shareholders. The best example is the Junta de Vigilancia of the first section of the Cachapoal river (O’Higgins region). Other similar experiences are being developed in the Canal Biobio (Negrete commune, Biobio Region) and the Longavi river (Maule Region). According to Dr. Jose L. Arumi, a main factor for the future success of these experiences is the degree of professionalization of the water user organizations, particularly the Juntas de Vigilancia. According to Dr. Arumi, when the water user organization is managed by a group of professionals preoccupied to improve the water management, they make very interesting things to improve the coordination with other stakeholders, like the experience in the first section of the Cachapoal river demonstrate. However, when the Juntas de Vigilancia are managed by large farmers preoccupied uniquely to protect their private property over water, these types of experiences do not work at all. Dr. Jose L. Arumi, personal email communication, March 9 of 2016. As the dominant voices among irrigators are (still) those defending the current model of water market and private property over water, this situation shows the giant challenges for water user organizations in relation to future processes of water governance to be implemented at the river basin scales.

management practiced by irrigators' organizations. The water market is trying to colonize the society.

In another fundamental aspect, irrigators criticize the Bachelet water reform because it is only targeting the consumptive water rights (agriculture, forestry) but not the non-consumptive water rights, owned completely by hydropower corporations. In this point, irrigators are criticizing what they define as "privileged treatment" received by the hydropower sector corporations, who do not participate in their water user organizations either (with the exception of the mentioned experience in the Cachapoal river). Irrigators also argue that they would be open to integrating the hydropower corporations as water shareholders into their Juntas de Vigilancia. However, hydropower corporations are not interested in this offer. So, irrigators want to integrate both powerless water subjects (APRs) and powerful water subjects (hydropower companies) into their logic of managing water for irrigation at the river basin scale. While the formers have cultural practices beyond the market, the latter is completely embedded in the market logic but at a higher level. I think the irrigators have very good intentions to integrate to other actors into their organizational logic, but they are not aware that other water subjects think differently than them. More importantly, irrigators do not realize that their anti-state politics is not contributing to solving the big gap in governance precisely created by the Chilean neoliberal model of water management, which privileged the market relations to the detriment of cultural and socio-political dimensions of water.

Beyond the good intentions of irrigators, they do not realize that the core problem is the gap of governance among them and the other water subjects, including the state.

For the state, this gap in governance is precisely the lack of state power because the property of water rights is controlled by the irrigators, mainly large farmers and agribusiness. However, irrigators are right: the state is not treating them with the same rule as it treats the hydropower corporations. In this way, the hydrosocial configuration becomes much more complex when hydropower and environmentalists are integrated in the ongoing process of water struggles. This is so because maybe irrigators can find in hydropower a water subject similar to themselves because they are market oriented too. However, at the same time, hydropower development has its own internal opposition represented by the growing Chilean environmental and anti-dam activism. These resistance groups are claiming to declare water as a commons, so they are aligned with the state, although not completely, as I will demonstrate in the next chapter. The growing environmental, anti-dam, and water movement desires to create a new configuration in which water must be considered as a commons. They are scaling up the political agenda of water commons as the new hydro-modernity for the 21st century.

CHAPTER 6

IMAGINING AND CONSTRUCTING A COMMONS HYDRO-MODERNITY FOR THE 21ST CENTURY: HYDROELECTRIC DEVELOPMENT, ENVIRONMENTALISMS, AND THE SCALAR POLITICS OF ANTI-DAM ACTIVISM AND OTHER WATER MOVEMENTS IN CHILE

“Si pudieran venderían, el aire y hasta a su madre / la nieve de estas montañas, es de todos o no es de nadie”

Angel Parra, 2009¹¹¹

“The only viable alternative political strategy is one that dissolves the existing contradiction between private and individual interests on the one hand and state power and interests on the other and replaces it with something else. It is in this context that much of the current left concern with the re-establishment and reclamation of the ‘commons’ makes so much sense. The absorption of private property rights into a comprehensive project for the collective management of the commons and the dissolution of autocratic and despotic state power into democratic collective management structures becomes the only worthy long terms objectives”

David Harvey, 2014, p. 50

¹¹¹“If they could they would sell it, the air and even their mothers,/ the snow of these mountains belongs to everyone or to no one”, *Patagonia sin Represas*, song number one in the album “Voices for Patagonia”. Available at: <http://www.patagoniasinrepresas.cl/final/voces-por-patagonia.php>

“Opening up the debate over water-as-commons organized through an egalitarian and therefore democratic being in common (as the form of political organization of the social) might permit shifting the terrain somewhat from the currently dominant ethical concern with ‘justice’ and an analytical focus on struggles of resistance to more directly and openly political visions and imaginaries that might nurture and galvanize politicized struggles aimed at a more egalitarian transformation and collective management of the commons of the earth. Such a scholarly perspective and situated political position would move away decidedly from considering water as a predominantly techno-managerial concern to one that focuses squarely on socio-biological life and well-being [because] it is precisely such a mode of consensual techno-managerial management within an assumedly undisputed frame of market-led efficiency that reproduces the existing water inequalities”

Erik Swyngedouw, 2015, p.230

1. Commons hydro-modernity as a geographical project for the 21st century

In this chapter, I complete the analysis developed here by incorporating two additional water subjects into the analysis: hydropower corporations and environmental/water social movements. Along with water user organizations, agribusiness, campesinos, indigenous people, and the state, they are the final two main stakeholders participating in the ongoing hydro-struggles in the Biobio and Santiago regions of Chile. These hydrosocial struggles were produced and nurtured by the previously discussed accumulation processes which I subsumed under the labels Liberal,

Keynesian, Socialist and Neoliberal hydro-modernities. My argument is that growing water crises and hydrosocial metabolic rifts are forcing the transition from neoliberal to a commons hydro-modernity, which means a major shift away from the current neoliberal water governance based on water markets and profits, towards another based on human needs. This commons argument also includes non-human actors such as ecosystems, rivers, lakes, aquifers, and the whole biodiversity of water bodies and associated ecological life.

I contend that the hydrosocial metabolic rifts produced by neoliberal extractivist development have created the current configuration marked by growing water conflicts but also new spaces of dialogue, debate, contestation, and eventually democratization among the state, communities, water movements and corporate powers including hydropower and forestry. A historical opportunity is emerging from this new transitional configuration. It is one that will potentially overcome private ownership over water as the main barrier to radical changes oriented to restoring the sustainability of the hydrosocial metabolism by collectively and democratically managing river basins and water resources. Commons are “re-emerging” (McCarthy, 2005; Wall, 2014; Harvey, 2014) as an alternative to framing new modes of water governance that recognize the existence of other actors with different rationalities within the river basin (market, state, and/or community-led). Unlike water markets, water commons rationality does not seek to colonize other water subjects under their own logic. To the contrary, commons hydro-modernity is an open space for constructing a political-ecological debate over water and other natural assets in an egalitarian and more democratic way, in which the hierarchical,

techno-managerial and market-led approaches can participate, but wherein they cannot dominate the scenario of hydro-governance based on their economic power. Water governance democratization is not subordinated to markets.

In this respect, in the previous chapters I have illustrated how water user organizations seem to be an efficient model of water management for irrigation, but their value for managing and deploying processes of hydro-governance beyond the irrigation sector at the river basin scale is unclear, doubtful, and uncertain. There are corporate players such as forestry and hydropower on the one hand, and rural workers, peasants without water, Rural Potable Water (APRs) communities, environmentalists and water movements on the other. The latter individuals, groups and communities do not have the same water needs and interests that irrigators do, although corporate power is much more aligned with water user organizations. However, Chilean environmentalists and water movements are mainly composed of urban and rural individuals, who are groups and communities without water rights. This automatically excludes them from the chance to participate as shareholders in the water user organizations, in case it were used as a model for implementing a commons hydro-modernity program at the river basin and national scales. This makes it difficult to envision the transformative process of democratizing water governance based only on water user organizations, although they remain as the most important form of water community management for irrigation in the nation.

For that reason, in the current process of water reform, several alternatives to creating new water institutions at a higher level or beyond irrigation have been proposed in order

to coordinate the different stakeholders and govern the water crisis at the river basin and national scales. As I already mentioned, the proposals include Integrated Water Resources Management, River Basin Management, and within the state, a National Water Agency, an Inter-Ministerial instance and a Water Sub-Secretary (Banco Mundial, 2011, 2013; Arumi, 2015; Delegacion Presidencial para los Recursos Hidricos, 2015).

It is within this whole water governance picture that hydropower corporations appear as a core river basin stakeholder because they own all the non-consumptive water rights from the country. Non-consumptive water rights are different from consumptive water rights owned by farmers and irrigators. The category of non-consumptive water rights was created by the 1981 Water Code and they “were intended to foster hydropower development in the upper parts of river basins—in the mountains and foothills—without harming farmers downstream in the valleys who had preexisting water rights” (Bauer, 2009: 601). According to Bauer, since its inception, the new category of non-consumptive water rights have created three kinds of water problems at the river basin scales: *monopoly power* (e.g. a high concentration of water shares in three corporations, see below), *speculation with water rights* (as described in chapter 5, but at the level of hydro corporate power), and finally, *governance failures*, associated with conflicts among hydro corporations and irrigators. This latter problem arises because although the 1981 Water Code created the concept of non-consumptive water rights it “said little about how exactly they could be exercised or what duties were owed to the owners of consumptive water rights. In the 1990s, a series of water conflicts between irrigators and hydropower companies revealed the Code’s flaws and incompleteness” (Bauer, 2009:

602-603). In this chapter I also addresses ongoing cases of conflicts among irrigators and hydropower corporations in the Biobio region (Punilla), which is included in a brief and general analysis of hydroelectric development (see below).

Nonetheless, a core theme for this last chapter is the historical-geographical formation of a broadly defined Chilean environmental movement that arose under the Pinochet hydro-modernity in the form of NGO's (Ulianova et al, 2012). This movement has evolved toward community-based, trans-class water movements, including popular or marginal urban-rural people, urban middle classes, and some elite individuals. They and local communities who are being dispossessed of their water resources propose the political agenda of water commons as a culturally egalitarian, sustainable and more democratic approach to water governance for the 21st century.

An important segment of this diverse Chilean environmental movement evolved from its opposition to hydropower plants, principally against large dams (Rodrigo et al, 2007; Orrego, 2013). Hydropower development can be seen as a geographical project envisioned to supply the lights of modernity oriented towards producing subjects with access to electricity (CHILECTRA, 2001). As noted by Bakker (2010), electricity also is a material emblem of citizenship in modern times. In Chile, electric modernity began in Santiago and then expanded to other regions. It began as a mixed production coming from thermal and hydroelectric plants, which were important to both industrialization and urbanization processes deployed during the first half of 20th century in Chile. Similar to the forestry development reviewed in chapter 3, hydroelectric development originally

unfolded as a series of liberal private initiatives (1900-1942), and then it was centralized under the conduction of the Keynesian state, which created the main state hydro corporation ENDESA (1943) as the first step forward to creating a national power grid (1943-1989). Then, this company and the other important private CHILECTRA were privatized by national actors during Pinochet's regime (1981-1989), and then gradually privatized and transferred to global corporations during the first decade of the post-dictatorship of neoliberal democracy (1990-2000) (Chart 6.1). The privatization of the hydro power plants and non-consumptive water rights owned by ENDESA and CHILECTRA meant that practically all the non-consumptive water rights were also privatized and trans-nationalized (Bauer, 2009). Unlike consumptive water rights, which are principally owned by national large farmers but also growing transnational agribusiness (chapter 5), non-consumptive water rights are today highly concentrated in three hydro corporations: ENDESA (ENDESA Spain & INEL Italy), COLBUN (Matte Group, Chile, same CMPC), and GENER (USA).

The privatization of hydropower development since the 1980s created its own internal opposition: environmental, anti-dam, and water movements. Hydropower development has been contested since the at least the 1980s, precisely when hydropower (and forestry) public companies were being privatized. This cannot be a mere coincidence. I analyze these processes of contestation as the scalar politics of Chilean environmental and water movements, which are struggling against both hydropower and forestry development. The former is contested through widespread anti-dam activism and the latter through

growing campesino and Mapuche movements against forestry plantations and industries in southern Chile.

Chart 6.1 Hydroelectric development and different modes of hydro-modernity in Chile

Periods aprox.	State and market-led Hydro-modernity	Main Hydroelectric companies	Communities and Commons hydro-modernity
1897-1942	Liberal	National and foreign (private) CHILECTRA (1921, private)	Campeños, Anarchists, Mutualism, Mapuche
1943-1970	Keynesian	ENDESA (1943, public)	Labor movement
1970-1973	Socialist	ENDESA (public) CHILECTRA(nationalized)	Revolutionary urban & peasants movements
1974-1980	Neoliberal		
	<u>Stage 1:</u> Pre-Privatization	ENDESA, CHILECTRA	Resistance to dictatorship: NGO's and new popular movements
1981-1989	<u>Stage 2: Re-regulation</u> 1981 Water Code 1982 Electric Law Subdivision CHILECTRA; Creation of COLBUN	ENDESA, CHILECTRA (CHILMETRO, CHILQUINTA, CHILGENER) ENERSIS, COLBUN (1986)	Urban guerrilla against dictatorship: Communist Party and the FPMR Chilean environmentalism emerges Non-consumptive water rights Conflicts between hydropower and irrigation
1989-1999	<u>Stage 3:</u> Privatization to local capital	ENDESA, ENERSIS, CHILQUINTA, CHILGENER, COLBUN	Local communities and extra-local activists (national and foreign) NGO's and anti-dam activism
1999-2015	<u>Stage 3:</u> Privatization to g-local capital Monopoly power	ENDESA, AES-GENER, COLBUN	Water movements Mapuche movement Constituent Assembly movement
2005-2015	2005: Reforms to Electric Law & Water Code +Rivers for profit +Privileged treatment to hydro generation 2015: "Energy 2050" Program: envisioning a sustainable energy future?	+Hydro projects led by three corporations want to dam (still undammed) Chilean river basins +From the "energy internal crisis" to "exporting energy" +State preference for hydro (and forestry) developments +Despotic state power	+Cases: Alto Maipo, Punilla, HidroAysen, and Neltume +Suppressing and criminalizing water/Mapuche movements +Conflicts between the state and water/Mapuche movements in water governance perspective +From resistance to the scalar politics of water commons

Sources: own elaboration with info taken from my fieldwork, ENDESA (1943, 1993), Beyer (1988), Johnston et al (1998), CHILECTRA (1996, 2001), Monckeberg (2001), Fazio (1997, 2010), Parisi et al (2000), Rodrigo et al (2007), Bauer (2009), Vince (2010), Prieto et al (2012), Ulianova et al (2012), Nelson (2013), Orrego (2013), Susskind et al (2014), Chile Sustentable (2016), Torres et al (2016), El Ciudadano (2016), www.energia2050.cl/

Neoliberal hydro-modernity has created its own internal opposition, represented by environmental and water movements. These movements are the main material and human agencies deploying and promoting the political and socio-spatial agenda of water commons. I think here one can find one of the main historical blocs (Loftus, 2012) produced within neoliberal hydro-modernity that is trying to overcome the market-led regime of water governance in Chile. This process is also the collective subjectivation of water subjects under neoliberalism. Because of these tensions between subjective desires of activists for radical changes and the structural assemblages constraining the changes (political elites and corporate power controlling the state, the Constitution, irrigators, etc.), the transition from neoliberal hydro-modernity to the modernity of water commons is not (and will not be) easy, mainly due to the issues of private property relations involved, which in any case also are being strongly challenged by a recent national movement for a new Constitution¹¹².

¹¹² Around 2008 and 2009, during the campaign for the presidential election of 2009, several left-wing traditional and new parties, along with a broad citizen movement composed by academics, NGOs, students, cultural, artistic, and political organizations, among others, began the idea of a “Constituent Assembly” (*Asamblea Constituyente*, “AC”) to change the authoritarian 1980 Constitution of Pinochet. This Constitution was actually designed by Jaime Guzman, a Chilean professor of law at the Catholic University of Santiago, who was also a creator of the right-wing party “UDI” in 1981, and who was assassinated by members of the radical left-wing urban guerrilla *Frente Patriótico Manuel Rodríguez* (FMPR) in 1991. Guzman was the main brain behind the Constitution signed by Pinochet and ratified in a contested plebiscite that finally legitimized the 1980 Constitution. This political body is actually the legalization of the restoration of class power after the coup d’état of 1973. That is, the main legal body (and last bastion) sustaining the whole of the Chilean neoliberal project. Since 2010, the movement “AC” has been steadily growing, and for that reason Bachelet also used this citizen program for a new constitution as a strategy for getting elected, promising to revise and change the 1981 Constitution. In effect, as I demonstrated in chapter 5, Constitutional changes are among the last *legislative* barriers to the transformative processes oriented to democratizing the water governance, but also to creating a truly democratic, egalitarian and sustainable society. In October of 2015 Bachelet announced by television how this campaign’s promise will be put into practice. Bachelet proposes a “constituent process”, which will consider at least four ways to change the 1981 Constitution: 1) The Congress, 2) A Mixed Constitutional Commission composed of Parliamentarians and citizens, 3) A Constituent Assembly composed of a group of people chosen

Nonetheless, in light of the current water crisis and hydrosocial metabolic rifts described in previous chapters, this socio-ecological and institutional transformation is an irreversible process by which the different stakeholders will have to learn one from each other, sharing knowledges, information, and different resources to collectively figure out the best manner to co-exist in a shared geographical basin with limited water resources to be shared (cf. Arumi, 2015). It is a broad cultural change in water management, promoting the river basin scale as an appropriate level of water management but also considering cross-scale influences from global, national and local socio-environmental changes. The process would necessarily imply gradually changing market notions of private property over water into the notions of water as both collective property and a common-pool resource for satisfying both human and non-human needs (Ostrom et al, 2012; Wall, 2014; Harvey, 2014; Swyngedouw, 2015).

If water is first of all produced by ecosystems (the hydrological cycle), and then (and only then!) appropriated by society and markets (the hydrosocial cycle) (cf. Linton and Budds, 2014), this process also demonstrates the order of things. First comes the environment, then the society, and last markets and capitalist production. Under this reasoning, I think that commons hydro-modernity appears as a new standard for

specifically to draft the new Constitution, and 4) Call to elections so the citizen can choose among options 1, 2 or 3. The process begins with communal, provincial and regional assemblies between March and October of 2016. If this Constituent process is successful, it will eventually change the Chilean Constitution for the fourth time (1833, 1925, 1981, 20...?), but for the very first time the change would be made in a democratic way, that is, the Constitution would be (desirably) drafted by people and citizens and not by a minority powerful elite of politicians, landowners, and entrepreneurs protected by military power, like in 1833, 1925, and 1980. See Salazar (2009, 2011, 2012), See also at <http://www.gob.cl/infografia-conoce-las-etapas-del-proceso-constituyente/> for the current “constituent process” of Bachelet

sustainably governing hydrosocial metabolism for the 21st century, democratizing and making the social relations that exist among state institutions, corporations, irrigators, peasants, civil society, and urban-rural populations without water rights but who live within watersheds more sustainable. Commons hydro-modernity is water for people and the environment, beyond the market-led orientation but recognizing the co-existence of markets, states, and communitarian cultures of water management as different and/or alternative ways of organizing the hydrosocial metabolism within and across hydro-scales. There is a commons imperative: water is firstly a use value and then an exchange value, which radically inverts the current status quo of neoliberal hydro-modernity, in which water is first a commodity and then a use value. In commons hydro-modernity, even market-led approaches will be subordinated to the ecosystems, community's and the whole society's needs. The rules and institutions to govern these hydrosocial relations will be debated, negotiated and decided democratically among stake holders in the transition process, organized by a democratized state jointly with organized communities, environmentalists and water movements, civil society and the private sector. A new geographical project will emerge to govern the Chilean hydrosocial metabolism in the 21st century, a project based on water commons governance at river basin and national scales.

2. Hydropower development in Chile: from private to public to private again

As Chart 6.1 indicates, the production of hydroelectric natures began to be deployed geographically during the first decades of the twentieth century as private initiatives, both national and foreign. In 2016, the situation is similar: national and foreign private

corporations control the production, transmission and distribution of hydro-electricity, mainly in the river basins located in the center-south of the country.

In December 2015, the energy produced by hydro-technologies (dams and run-of-the river) represent 40.7% (6,470.5 Mega Watts, MW) of the total power capacity installed in the country, which ascends to 15,911.10 MW. The main power technology used historically in Chile is thermoelectric plants, which supply the 51.4% (8,177 MW) of energy nationwide. All this electricity is transmitted through a national power grid called *Sistema Interconectado Central* (Central Interconnected System, or SIC), which covers 92.5% of the total Chilean population (CDEC-SIC, 2014: 4). The rest is covered by transmissions systems that function independently in the northern area, which is called *Sistema Interconectado del Norte Grande* (Northern Interconnected System, or SING), and small systems in the regions of Aysen and Magallanes (Patagonia) (Figure 6.1). Finally, it is relevant to highlight that a small portion of the national energy is produced by wind (5.2%) and another by solar technologies (2.8%), which are expected to grow in 2016 but also during the next decades (Table 6.1)

Figure 6.1 Electricity Transmission Systems in Chile (SING, SIG, Aysen, and Magallanes)



Source: Center for Environmental Sciences EULA-Chile

Table 6.1 Electric capacity installed in Chile’s SIC according to power technology (Mega Watts)

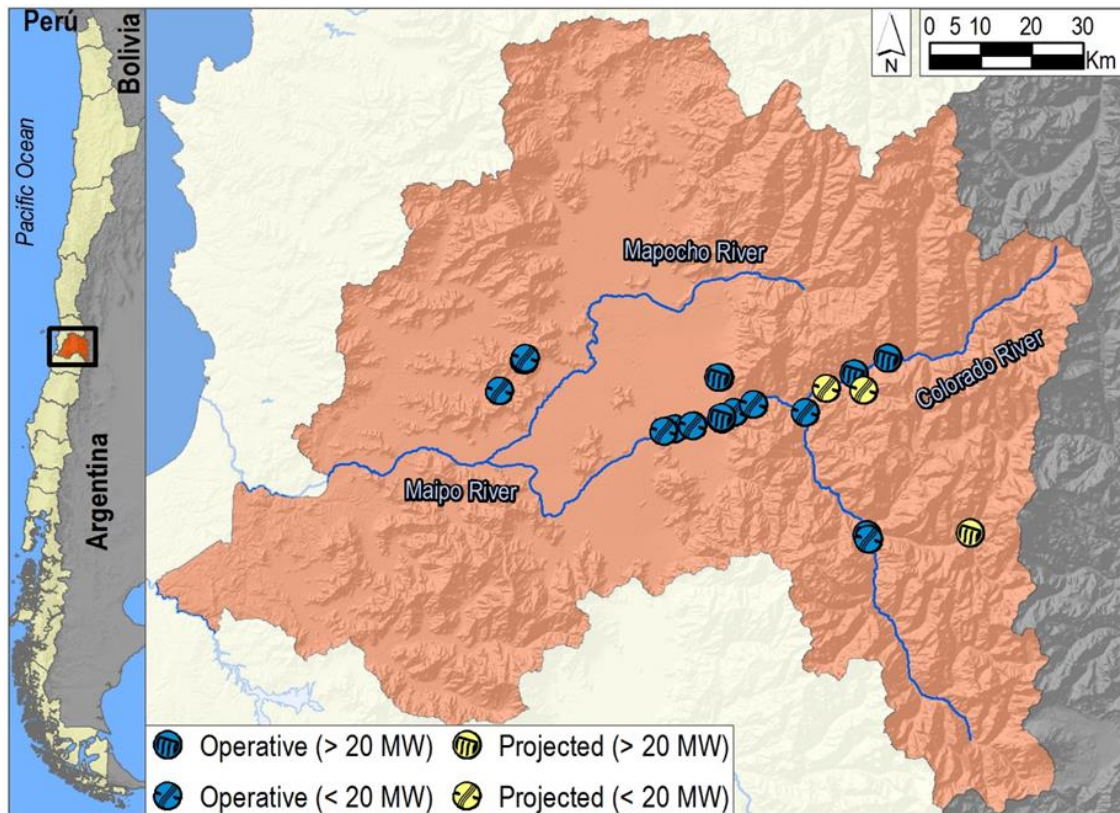
Power Technology	2015		2016		2016	
	December		February		Projection to December	
	MW	%	MW	%	MW	%
Thermo	8,177.00	51,4%	8,177.00	50,9%	8,353.50	47,1%
Dam	3,402.00	21,4%	3,402.00	21,2%	3,402.00	19,2%
Run of the river	3,068.50	19,3%	3,068.50	19,1%	3,281.10	18,5%
Wind	819,9	5,2%	819,9	5,1%	1,120.40	6,3%
Solar	443,6	2,8%	584,6	3,6%	1,440.40	8,1%
Total	15,911.10	100,0%	16,052.10	100,0%	17,738.40	100,0%

Source: Centro de Despacho Económico de Carga del Sistema Interconectado Central (CDEC-SIC). Available at: <http://www.cdecsic.cl/informes-y-documentos/graficos-y-estadisticas/capacidad-instalada/> (Retrieved in March 13, 2016)

45.8% (or 2,961.8 MW) of the total of 6,470.5 MW produced by hydro plants in Chile are located in my research sites, the Biobio and Santiago regions. Of these, 2,628 MW (40.6%) are installed in eight hydro plants located in Biobio, four dams and four run-of-the-river (ROR) facilities. The rest of the 333.8 MW (5.2%) are installed in eight ROR hydro plants in the Metropolitan Region of Santiago (Chart 6.2 below). There are more mini-hydro plants (less than 20 MW) installed and operative in both regions, and also other projected hydro plants in both region too (Figures 6.2 and 6.3 below). Overall, my two research regions roughly represent almost half of the hydropower capacity produced in the whole country, which in turn means around 20% of the power capacity installed in the country (Table 6.1). This is especially true in the Biobio region, whose river basins supply 40.6% of the hydropower produced in the nation. In effect, the main and biggest dams constructed until now in the nation are located in Biobio. These correspond to the Ralco (690 MW) and Pangué (467 MW) dams, which as I already said were constructed during the 1990s and early 2000s, displacing Mapuche-Pehuenche communities that historically inhabited the Andean mountains upstream of the Biobio

river. These mega-dam geographical projects were backed up by the World Bank, the Chilean government, and developed by the already then privatized ENDESA (Johnston et al, 1998; Nelson, 2013).

Figure 6.2: Operating and Projected hydro plants in the Santiago region



Source: elaborated with information from the Ministry of Energy, Center for Environmental Sciences EULA-Chile

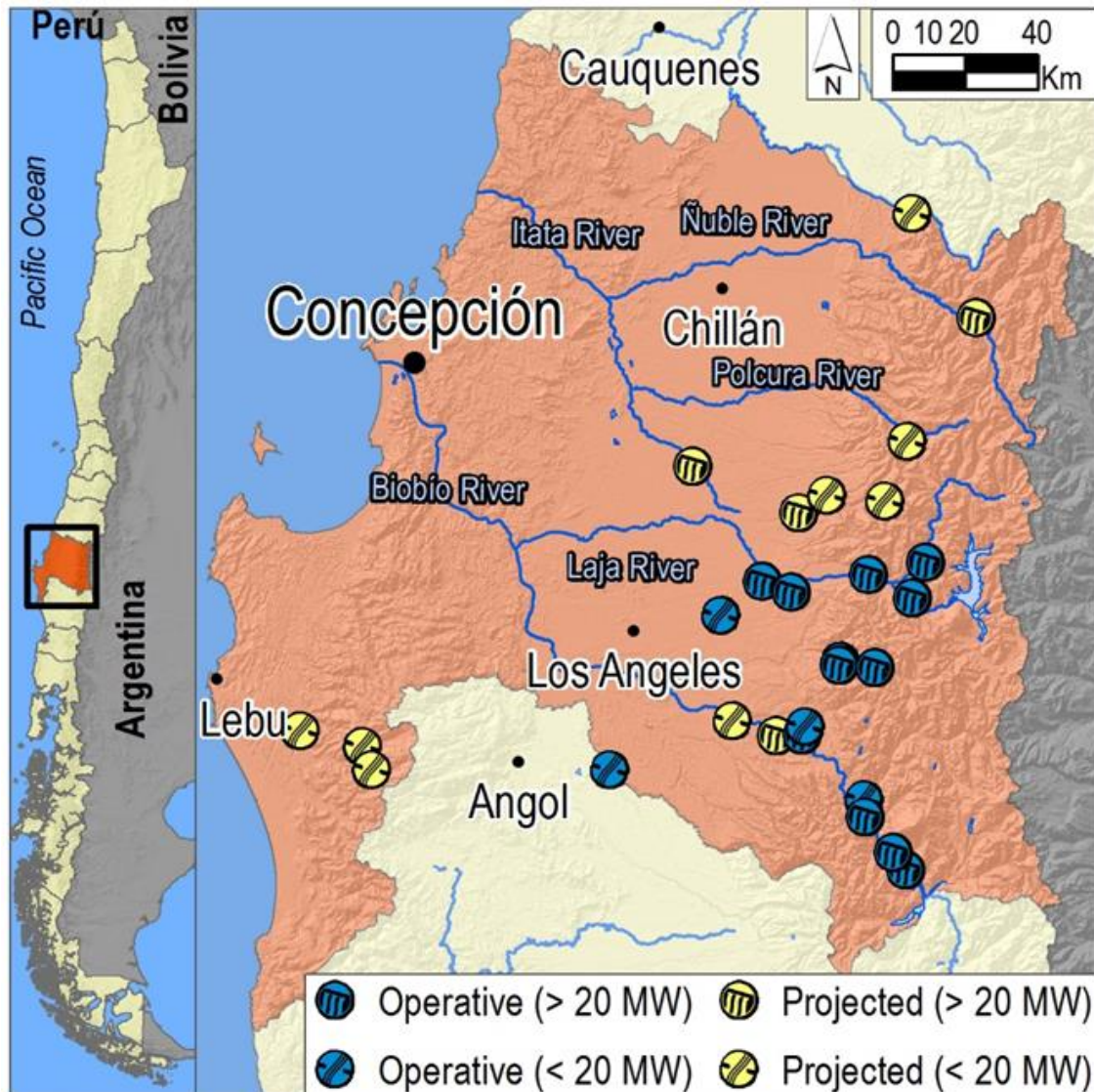
Chart 6.2 Hydro plants in Santiago and Biobio regions

Region	Hydro-Plant	Year	Type	MW	Commune	River, Canal, Lake	Company (2015)
Santiago	Mapocho	1900	Thermo		Santiago Centro	n/a	
	La Florida	1909	Run-of-the-canal?	28,5	San José de Maipo	Maipo river> Canal San Carlos	Electrica La Puntilla
	Maitenes	1923	Run-of-the-river	30,8	San José de Maipo	Colorado river	AES GENER
	La Puntilla	1926	Run-of-the-canal?	22,1	Pirque	Maipo river> Canal Sirena	Electrica La Puntilla
	Queltehues	1928	Run-of-the-river	48,9	San José de Maipo	Maipo river	AES GENER
	Carena	1937	Run-of-the-canal?	9	Curacavi	Mapocho river> Canal Las Mercedes	COLBUN
	El Volcán	1944	Run-of-the-river	13	San José de Maipo	Volcan river	AES GENER
	Alfalfal	1991	Run-of-the-river	178	San José de Maipo	Colorado & Olivares rivers	AES GENER
	Mallarauco	2011	Run-of-the-canal?	3,5	Melipilla	Mapocho river> Canal Mallarauco	GPE
	Alto Maipo*	?	Run-of-the-river	531	San José de Maipo	Volcan & Yeso rivers	AES GENER
Biobio	Chivilingo	1897	Run-of-the-river		Lota		Closed, Tourist Atr.
	Abanico	1948	Run-of-the-river	136	Antuco	Laja river	ENDESA
	El Toro	1973	Dam/Reservoir	450	Antuco	Polcura river, Laja lake	ENDESA
	Antuco	1981	Run-of-the-river	320	Tucapel	Polcura, Laja & Pichipolcura rivers Malalcura, Cipreses & El Toro <i>esteros</i>	ENDESA
	Pangue	1995	Dam	467	Alto Biobio	Biobio river	ENDESA
	Rucúe	1998	Run-of-the-river	178	Quilleco	Laja river> Canal Manzanar?	COLBUN
	Ralco	2004	Dam	690	Quilaco	Biobio river	ENDESA
	Quilleco	2007	Run-of-the-river	71	Quilleco	Laja river	COLBUN
	Angostura	2014	Dam	316	Santa Barbara	Biobio river	COLBUN
	Punilla*	?	Dam/Reservoir	93	San Fabian	Nuble river	Astaldi Concessioni E.R.L
Nuble*	?	Run-of-the-river	136	San Fabian	Nuble river	Electrica La Puntilla	

Sources: elaborated with data from ENDESA (1943, 1955, 1993); CHILECTRA (1996, 2001); and companies' websites: www.endesa.cl, www.gener.cl, www.colbun.cl, www.electricapuntilla.cl

(*) Under construction, see below

Figure 6.3: Operating and Projected hydro plants in the Biobio region



Source: elaborated with information from the Ministry of Energy, Center for Environmental Sciences EULA-Chile

Liberal hydropower development (1900-1942): This was the first stage of hydroelectricity production in the country. It began in Santiago in 1897 with a contract subscribed by the Chilean Electric Tramway and Light Co. (German capital) and the Municipality of Santiago to install an electric tramway system in the city to replace the old horse-led public transportation. To feed the new electric tramway system, in 1900 this

company inaugurated the Central Mapocho (thermoelectric), one of the first power plants of this type in the country; and then in 1909 the Central La Florida, which used the water from the Canal San Carlos. To construct this hydro plant, in 1906 the irrigators of the Sociedad del Canal del Maipo entered into a contract with the Chilian Electric Tramway and Light Co., renting their water shares from the Canal San Carlos to produce electricity. The Central La Florida was the first hydro-plant to supply electricity for residential use in Santiago¹¹³. Later on, in 1919 an alliance of Chilean and US capitalists created the *Compania Nacional de Fuerza Electrica*, which in 1921 was fused with the Chilian Electric Tramway and Light Co. This fusion created the *Compania Chilena de Electricidad* (CHILECTRA). In 1923, CHILECTRA inaugurated the run-of-the river hydro-plant Maitenes in the Colorado river, a main tributary of the Maipo river located in the commune of Cajon del Maipo. In 1928, CHILECTRA also inaugurated the run-of-the-river hydro-plant Queltehues in San Jose de Maipo (Figure 6.2). Two years later, CHILECTRA was acquired by the South American Power Co. (USA capital), which maintained the ownership of this company until its nationalization in 1970 (CHILECTRA, 1996, 2001).

During these first decades of hydropower development, the main problems were the unconnected networks and the low quality of the service for people, perhaps because the majority of the hydro plants were private initiatives oriented to feeding emerging industrial projects (ENDESA, 1943). This was the case of the *Compania Manufacturera de Papeles y Cartones* (CMPC), which inaugurated the run-of-the-river hydro plants La

¹¹³ Website of the Company: <http://www.electricapuntilla.cl/historia/>

Puntilla in Pirque (1926) and Carena in Curacavi (1937). Like the La Florida hydro plant, the La Puntilla and Carena plants use the force of water coming from irrigation canals to produce electricity. In this way, hydropower development opened new business opportunities for irrigators from Santiago, who rented their water shares to the hydroelectric companies to use them for producing hydroelectricity. For instance, the La Puntilla hydro plant inaugurated by CMPC in 1926 used the waters from the Canal Sirena, which still belong to the *Asociacion de Canalistas de Pirque*. Similar to the Sociedad del Canal del Maipo with the Chilian Electric Tramway and Light Co. (from 1921 CHILECTRA)¹¹⁴, the irrigators from Pirque also would have signed contracts for renting their water shares to CMPC. In turn, this company was producing electricity to feed its paper industries located in Santiago, which was closely associated with the forestry development that was also in its initial Keynesian stage during the 1930s (chapter 3). A similar situation can be inferred for the irrigators from the Canal Las Mercedes in Curacavi, who would have signed a contract to rent their waters to CMPC to operate the hydro plant Carena. A recent case of these alliances between irrigators and hydropower companies is the hydro plant Mallarauco inaugurated in 2011, in which a German company (GPE) also would have rented the water shares owned by the irrigators

¹¹⁴ The contract between the Sociedad del Canal del Maipo and CHILECTRA lasted 75 years (1908-1983). Once this term expired, in 1983 the Sociedad del Canal del Maipo exercised the option to purchase the hydro plant, which was included in the original contract of 1908. Since then, La Florida hydro plant is owned by the Sociedad del Canal del Maipo. Also, in 1996 CMPC sold the La Puntilla (commune of Pirque) and Carena (commune of Curacavi) hydro plants. The Sociedad del Canal del Maipo bought La Puntilla hydro plant, and COLBUN bought Carena. In order to manage their new hydroelectric assets, in 1997 the irrigators from the Sociedad del Canal del Maipo created the company “Electrica La Puntilla”, which represents the “electric” business of the most ancient water user organization in the country. See the website of the Company: <http://www.electricapuntilla.cl/historia/>

of the *Asociacion de Canalistas Canal Mallarauco*, located in the commune of Melipilla. These cases of run-of-the-*canal* hydro plants demonstrate how some irrigators gradually have entered the hydropower sector. Overall, this first stage of liberal hydropower development was completely controlled by private capital, national and transnational, but it was performed poorly because the demand for energy was growing faster than the supply (ENDESA, 1993: 22-35)

Keynesian, Socialist, and Neoliberal hydropower development (1943-2005): For this reason, during the 1930s a growing group of engineers began to think of a plan oriented towards the mass production of energy in the country. In 1943 the *Empresa Nacional de Electricidad S.A* (ENDESA) was created by CORFO with the main goal of producing national scale power development, a task that lasted until the 1980s, when ENDESA and CHILECTRA began to be privatized (Beyer, 1988; Monckeberg, 2001; Bauer, 2009). For the first time, hydropower was envisioned as a national geographical project through the so called National Plan of Electrification for the country (ENDESA, 1943, 1993; Bauer, 2009: 610). This plan aimed to construct hydro plants and a national power grid for transmission and distribution (Figure 6.1). All this was under the Keynesian ideology expressed in the populist and developmental state based on import substitution that ruled between 1938 and 1973, which sought to industrialize the country, expand the electricity supply to growing urban centers, and to cope with the social effects of the economic crisis of 1929 and World War II (Moulian, 2006; Salazar, 2012). This Keynesian hydroelectric development was influenced from the beginning by global powers because to build the first large dam the World Bank made a loan to the Chilean

government in 1947, which in turn was the first loan made by the Bank with the aim of promoting water modernity via large dams globally (Bakker, 2010: 64). Thereafter, a series of hydroelectric projects were developed in Chile between 1962 and the mid-1980s, quadrupling hydroelectric capacity (ENDESA, 1993: 13; Nelson, 2013: 196). This shows that the global scale was from the outset exerted as key influence on national and local scale hydropower development in Chile. In the process, the state emerged as the provider of the new material emblem of citizenship represented by electricity to the growing urban populations and industrial development. It is important to note that this occurred in parallel with the processes of agrarian reform and nationalization of water (1964-1973). Jointly, these processes of agrarian changes and hydropower development created, gradually, the notion of water as a public good, which is important for current water movements (see below).

During this period, three main hydro plants were developed by ENDESA in the Biobio region: Abanico (run of the river, operational by 1948), El Toro (dam/reservoir, 1973), and Antuco (run of the river, 1981). All these hydro-plants use the water of the Laja lake, Laja river, and several tributaries, located in the Laja basin, which in turn is a sub-basin of the Biobio river (Figure 6.3 above). Laja lake is around 100 kilometers square (Parra et al, n/d). With the construction of these three hydro plants, the natural Laja Lake “was converted into Chile’s largest storage reservoir [to be] managed for both irrigation and hydroelectric purposes, according to the rules of operation in an agreement signed in 1958 by ENDESA and the National Irrigation Directorate (part of the Ministry of Public Works)” (Bauer, 2004: 100). For its size and strategic location in the Andes in

the center-south of Chile, the lake plays a strategic role in the all electrical production nationally. This is so because Laja lake “is by far the largest reservoir in Chile and the only one big enough to store water from more than one year's river flow, which makes it the ‘reserve battery’ for the entire central grid. It is also the center of the electricity price system because the CDEC uses a mathematical model of the lake's water levels to calculate the SIC's overall marginal costs-including estimates of the trade-offs (opportunity costs) involved in using water now versus storing it for later. These marginal costs in turn determine the timing and amount of thermal generation” (Bauer, 2009: 622-623). In other words, the quantity of water stored in the Laja lake is an strategic input used by the CDEC-SIC¹¹⁵. This organism “determines and coordinates the operation of all facilities of the central interconnected system [SIC]”, which includes the production (thermos, hydro), transmission and distribution of power in the country. Its main goal is to allow an efficient coordination among generation, transmission and distribution of energy “so that the cost of the electricity supply system is the lowest possible, compatible with a predetermined reliability”¹¹⁶. Under this framework “the value of water is defined as the opportunity cost of water stored in reservoirs, compared to other costs of power generation. In times of drought, this opportunity cost increases to equal the cost of producing an additional unit of electricity by thermal power. If there is no drought, however, the opportunity cost of stored water goes down and is defined as the cost of producing an additional unit by hydropower. The price of water, in other

¹¹⁵ *Centro de Despacho Económico de Carga del Sistema Interconectado Central*: Center for Economic Load Dispatch of the Central Interconnected System

¹¹⁶ Website of the company: <http://www.cdecsic.cl/sobre-cdec-sic/>

words, depends on the costs of energy and on hydrological estimates, but it does not reflect other demands or uses for water” (Bauer, 2009: 623-624). Simply put, this means that the demand of electricity coming from the CDEC-SIC to the hydro plants located in the Laja lake/river do not consider the irrigation and other uses (e.g. tourism) for the water stored in the reservoir. However, in the Laja system these multi-uses of water are backed up by the 1958 agreement between ENDESA and the irrigators. These latter irrigate around 117,000 hectares and the former produce 1,150 MW¹¹⁷ with the water of the Laja lake/river. For this reason, there have been historical conflicts between the irrigators from the area and ENDESA, particularly during drought times, when the competition for using the water from the lake/river intensifies. During the most recent years, this competition became extreme due to the low levels of water stored in the Laja lake caused by the drought. Historically, the lake has a capacity to store 5,587 million meters³ (Parra et al, n/d), which in 2014 reached the historical minimum record of around 400 million meters³ (La Segunda, 2014) but that during December 2015 increased to 1,416 million meters³ (Ministerio de Obras Publicas, 2016: 2). For these reasons, Adrian, the regional coordinator for the Presidential Delegate for Water Resources in Biobio¹¹⁸ indicated that as a regional government they have been coordinating meetings between the irrigators and ENDESA to figure out the best “rule of operation” for this critical hydrosocial situation around the Laja lake, because evidently the rules of operation agreed to in 1958 have changed as the water flows available in the reservoir have

¹¹⁷ This amount includes the Rucue hydro plant (run-of-the-river) inaugurated in 1998. See chart 6.2 above

¹¹⁸ Interview conducted in Concepcion, September 5 of 2014

substantially decreased. Although a new agreement or “rule of operation” for the 2015-2016 season was signed in December of 2015 between ENDESA, irrigators, and the state (Ministry of Agriculture, Ministry of Energy and Ministry of Public Works) (Ministerio de Obras Publicas, 2015a), the success of this agreement (the first after the one celebrated in 1958) will depend on the amounts of water stored in the reservoir, which by 2014 decreased drastically to less than 10% of its historical flows due to the drought. For the purposes of this chapter, the experience in the Laja Lake is an important antecedent for the current Punilla reservoir project in the Nuble river—located northern Laja (Figure 6.3)—because this water project is also envisioned to store water for both irrigation and hydropower production (see below). In addition, during the 1990s ENDESA also constructed the Pangué (1995) and the Ralco (2004) dams in the Biobío river, by which, as I said before, Mapuche people living in the area were displaced. This was a strong struggle of Mapuche people against ENDESA, which created an important lesson for the Mapuche communities and also for the development of Mapuche environmentalism, which since then has been showing fierce opposition to hydropower projects in southern Chile (Susskind et al 2014, see below).

Re-regulations and privatization: One of the tricky situations of hydropower development in Chile is that it is regulated by both the 1981 Water Code (non-consumptive water rights) and the 1982 Electric Law (Bauer, 2009). As stated above, the 1981 Water Code says nothing about how to coordinate hydropower with irrigators. I am not going to explain the details of the Electric Law of 1982 (see Prieto et al, 2012), but I only want to mention that for it, “water issues are addressed only in terms of fuel for

power generation” (Bauer, 2009: 605). This means that the 1982 Electric Law does not consider irrigators and other water uses (e.g. tourism, the environment) within its framework. It does not consider the high variability in the water flows due to natural variability and anthropogenic drought either. Moreover, the 1982 Electric Law and 1981 Water Code were enacted just before the privatization of ENDESA and CHILECTRA began during the mid-1980s. In effect, privatization was part of the “overall plan for reform” (Bauer, 2009: 624) for these hydropower public companies which were completely privatized in 1989 just before Pinochet left office (Bauer, 2009: 624-627). The details of this process of privatization of hydropower companies is beyond the space available in this chapter and it will remain as a future research project. I only want to highlight that the process was full of controversies because there were public officials of the military government who during the 1980s worked managing public hydroelectric companies and during the 1990s become their main owners. Particularly, Jose Yuraszeck, who from a director position in a state institution associated with hydroelectricity in 1979 evolved into the director of CHILECTRA in 1983 (Fazio, 1997: 198) and then become known as the “electricity czar” during the 1990s (Monckeberg, 2001: 48-51, 108-125; Fazio, 1997: 197-239). In 1981, CHILECTRA was subdivided in three companies: 1) “CHILECTRA Metropolitana” or CHILMETRO, oriented to the distribution of power in the Metropolitan Region of Santiago; 2) CHILECTRA Quinta Region or CHILQUINTA, oriented to the generation of power in the Valparaiso Region, and 3) CHILECTRA generation or CHILGENER, oriented to the generation of power¹¹⁹. In 1987,

¹¹⁹ The idea of splitting CHILECTRA and then privatizing it as separate companies was made in order to promote competition in the hydropower sector. This market-led strategy was not only applied with the “generation” and “distribution” sub-sectors but also with the “transmission” sub-sector. The latter was also

CHILMETRO was privatized and renamed as ENERSIS, a new holding in which Yuraszek participated as one of the main shareholders. From this platform, he was going to acquire ENDESA-Chile shares, and then sell them during the second half of the 1990s to ENDESA-Spain. This was a controversial transaction that became known as the “deal of the century” because of the money involved. Later on, when all the (dark) details about this process of dispossessing public hydro corporations became publicly known, it came to be known as “scandal of the century” (Parisi et al, 2000; Monckeberg, 2001:117-126; Bauer, 2009: 633). After the transfer was completed, ENDESA Spain became the new owner of all hydro plants and non-consumptive water shares owned by ENDESA-Chile, that is, all the hydropower public assets created since 1943, including those located in the Laja Lake and Biobio river. In turn, this meant the automatic trans-nationalization of all the non-consumptive water rights previously owned by ENDESA-Chile, which involves entire river basins all across the country.

On the other hand, CHILGENER, also created in 1981, was gradually privatized since 1984. This company remained controlled by local groups until 2001 as GENER, when it was sold to AES (USA), which renamed it and now it is called AES-GENER. Finally, in 1986 the Chilean state also created COLBUN, which also was privatized in 1996 and was partially acquired by the traditional Chilean Matte group (Fazio, 1997: 189), who finally acquired a controlling interest in the company in 2005 (Bauer, 2009:

controlled by ENDESA following the original Electrification Plan for the country (ENDESA, 1943, 1993). However, during the second half of the 1990s “the SIC’s transmission grid belonged to a new company named Transelec, which was a regulated monopoly under Chilean electricity law. ENDESA owned this company, too, until Chile’s Anti-Monopoly Commission recommended that ENDESA sell Transelec in the late 1990s. The buyer was the large Canadian power company Hydro Quebec” (Bauer, 2009: 626)

638-639). Although there are other small hydropower companies like the afore mentioned Electrica La Puntilla owned by the Sociedad Canal del Maipo, since 2005 these three corporations (ENDESA-Spain, AES-GENER or GENER, and COLBUN) are the main actors controlling the generation of hydro power in Chile.

2005's Electric Reform and privileged treatment of the hydropower sector.

During these two decades (1980-2000) of privatization and trans-nationalization of the hydropower sector, there has been growing state support and adjustment in legislations to benefit the hydropower sector, demonstrating privileged treatment to this type of power technology (Prieto et al, 2012). For instance, since March of 2000, when the government of Ricardo Lagos took office (2000-2005), the new administration proposed an Electric Law reform as “a priority”. After years of discussion this reform was approved in March of 2005, in what is known as the *Ley Corta II* (Bauer, 2009: 635-638). This Ricardo Lagos’ government reform consisted basically in “higher prices and long-term stability of prices [...] so that consumers would pay an estimated 12-20 percent more... The *Ley Corta II* was quickly approved by the Congress [which finally in gave to] investors and the incentives and security they were waiting for. [Then] in 2005, Chilean electric companies announced more than 20 new projects to be built over the next decade—totaling more than 5,000 MW, for a total cost of US\$4 billion” (Bauer, 2009: 637). It is within this institutional context favoring the transformation of rivers into corporate profits in which new geographical hydro projects began to appear rapidly in Chile during the last decade.

One of the most important was the HidroAysen project to construct mega-dams in Patagonia. This mega-project was proposed precisely in 2005 after the Ley Corta II, and it was envisioned to produce around 2,750 MW through two mega-dams in the Baker river basin and three in the Pascua river basin, flooding a total of 5,910 hectares, specifically 4,310 in Baker and 1,600 in Pascua (Torres, 2008: 166; Torres et al, 2009)¹²⁰. Additionally, the project was going to construct a transmission line of almost 2,000 kms. to transport the power to feed industrial and mining development in central and northern Chile (Vince, 2010; Romero-Toledo, 2014). In this initiative, ENDESA-Spain knew that it was going to be difficult to operate alone as foreign investor in the country because of the growing anti-dam movement (Bauer, 2009). For this reason, they made a strategic alliance with COLBUN, which was already controlled by Chilean capital (Matte group). It also was in this context that the Alto Maipo run-of-the-river hydro project (Santiago) was approved in 2009, and that the dam/reservoir Punilla (Biobio) was approved too in 2010. This new configuration characterized by aggressive state politics promoting hydropower development has also been creating its own internal opposition. That same year, 2005, the resistance to the HidroAysen project began to be articulated at international, national and local scales through the campaign “Patagonia without dams” (Rodrigo et al, 2007), which has been fueling and accompanying the growing opposition to dams and hydro projects in the center-south of Chile, particularly in Mapuche communities (Susskind et al, 2014; El Ciudadano, 2016). These hydrosocial processes announced a new era in the Chilean environmental movement. However, this movement

¹²⁰ See also the company’s website: <http://www.hidroaysen.cl/>

against dams in Patagonia grouped together several organizations that were already developing since at least the 1960s. Since then, these trans-class and cross-scale movements have been gradually developing the socio-spatial agenda for water commons.

3. Environmentalism, anti-dam activism, and the scalar politics of water movements: Exploring their contributions for democratizing water governance in Chilean river basins

3.1 Early environmentalisms (1968-1990)

Essentially, the Chilean environmental movement has gradually developed since 1968, when the Comité Pro Defensa de la Fauna y Flora (Committee for the Defense of Fauna and Flora), CODEFF was created. This NGO was organized by a group of scholars, faculty and professionals, and it was mainly oriented to conservation (Ulianova et al, 2012: 187)¹²¹. Then, during the dictatorship other organizations emerged which were mainly linked to religious groups¹²² and NGO's that were tolerated by Pinochet because they were seemingly not Marxist-Leninist or terrorists. These organizations, strongly supported by international agencies and donors, were capable of absorbing groups of intellectuals, professionals and other left-wing advocates. Some of these groups were expelled from their previous positions in universities and the state, but many of them were not exiled from the country after September 11, 1973. Thousands were also received asylum in different parts of the world. Others were expelled but they returned

¹²¹ See also the CODEFF website: <http://www.codeff.cl/somos/presentacion/que-es-codeff/>

¹²² For instance, the *Vicaria de la Solidaridad* directed by the Cardenal Raul Silva Henriquez

near the end of 1970s and especially during the 1980s, both legally and illegally (*clandestinos*). As a way to struggle against the dictatorship, these new NGOs organized different strategies for recuperating democracy. These initiatives were strongly based on a popular urban movement known as *movimiento de pobladores* which was composed mainly of poor and marginal urban groups, the descendants of old *peones* and campesinos who had immigrated to the cities since the 1940s onward (Castells, 1973; De Ramon, 1990; Salazar, 2012: 169-226). These people represented the main social force that was organizing resistance strategies in both marginal but also middle class urban neighbors, particularly in the main cities like Santiago, Valparaiso and Concepcion, in which these NGO's based their political work (Salazar, 2011, 2012).

A crucial fact across this process of creating alternative types of resistance within the dictatorship was the re-orientation of Communist Party politics in early 1980s. The new orientation was known as the *Política de Rebelión Popular de Masas* (Mass Popular Rebellion Politics). This strategy “was encouraged to use ‘all forms of struggle’ even ‘extreme violence’ and recognized the ‘right of the people to rebellion’” (Rojas, 2011: 18), that is, to undertake an armed struggle against Pinochet. From a historical perspective, this Communist strategy is evidently understandable in light of the persecution of their directors and members, who were systematically tortured and assassinated during the first decade of Pinochet's dictatorship. For this reason, the Chilean Communists decided to combat the tyrannical regime by extra-legal means. In doing so, the so called *Frente Patriótico Manuel Rodríguez* or FPMR (Manuel Rodríguez Patriotic Front) was created in 1983. This armed movement was based on ex fighters who had struggled for Nicaragua and other Latin American Guevarist/Marxist-Leninist

guerrillas. In September of 1986 they attempted to assassinate Pinochet, but they failed (Rojas, 2011).

The radical movement of FPMR, along with all the others religious organizations, NGOs, *pobladores*, students, unions, and other civil society protesters against the dictatorship, created a socio-political configuration that finally was going to obligate Pinochet to “negotiate” a transition to democracy via a Plebiscite in 1988 and Presidential elections in 1989¹²³. In effect, after the economic crisis of 1982, between 1983 and 1987, these radical and democratic movements of resistance deployed 22 national scale protests against the Pinochet dictatorship, in which was included “we attempted to assassinate the tyrant” but mainly “we demonstrated that we were ungovernable under a neoliberal dictatorial regime” (Salazar, 2011: 16). It is worth noting that all these actions and national scale protests against Pinochet unfolded in parallel with the privatization of hydropower public companies and other commons (education, retirement, health care, etc.) during the 1980s.

¹²³ However, these social movements were excluded from the “negotiations” for the transition. Instead, these negotiations were appropriated by the elites of new and traditional political parties grouped in the *Concertacion*, who finally “accepted” the conditions imposed by Pinochet and his main civil servants to the transition, which were basically the acceptance of the 1980 Constitution and all the neoliberal projects implied in it. Under this neoliberal agenda, the *Concertacion* won the Presidential Elections in 1990 and since then this coalition of center-left parties governed the country until 2010: Patricio Aylwyn (1990-1994), Eduardo Frei Ruiz-Tagle (1994-2000), Ricardo Lagos (2000-2006), Michele Bachelet (2006-2010). See Tironi (1998), Salazar (2011), Atria et al (2013), and Urrutia et al (2013) for different perspectives about this process. In the presidential elections of 2009 the *Concertacion* was defeated by the right-wing coalition “Alianza por Chile” and its leader Sebastian Pinera (2010-2014) took the presidential office. During the four years of Pinera’s government, the *Concertacion* was restructured and renamed “Nueva Mayoria” (NM), in which the only novelty was the inclusion of the Communist Party within the coalition, which in turn meant the Communists returned to having parliamentarians and people in the government after more than 40 years of absence in power. Their last participation was during the Allende government (1970-1973). Thus, with the Communist party as the new member, in 2013 the *Nueva Mayoria* won the presidential election with Michele Bachelet (2014-2018).

It was in this general situation of (hidden) privatization and broad social movements resisting and combating Pinochet's dictatorship in which the first environmental NGO's in Chile emerged. In 1987, the *Instituto de Ecologia Politica* (Institute for Political Ecology) was funded by Dr. Manuel Baquedano, a sociologist who was exiled to Germany and returned to Chile influenced by the ideas of the German Green Party. Then, in 1988 (his spouse) Sara Larrain funded the *Red Nacional de Accion Ecologica*, RENACE (Ecological Action's National Network), which was the first attempt to organize a national scale environmentalist network, whose main feature was non-violence (Ulianova et al, 2012: 192-193). This pacific character of RENACE distinguished it from the Communist and radical left-wing strategies against Pinochet. However, these new environmentalist NGO's were also strongly committed to the struggle against Pinochet. In this respect, both the *Instituto de Ecologia Politica* and RENACE had a marked anti-neoliberal approach since the very beginning. Similar to the communist party and radical left-wing groups, these first environmental NGOs were born criticizing the process of enclosing the commons and privatizing nature which had operated since the 1980s in Chile, and which, as I have demonstrated in this research, was going to be maintained and deepened during the subsequent decades of neoliberal democracy and socio-spatial production of hydrosocial metabolic rifts (1990-2015).

3.2 Recent environmentalisms (1990-2015): from anti-dam to water movements

In light of the rapacious advancement of market mechanisms for governing Chilean environments and hydrosocial assemblages, it is not surprising that during the 1990s new environmental movements appeared on the national scene and particularly against mega-

dam projects. In 1991, the Chilean ecologist Juan Pablo Orrego, who also was exiled and pursued a master in ecology and anthropology at York University in Canada during the 1980s, funded the *Grupo de Accion por el Biobio* (Biobio Action Group), which was created as a response to the ENDESA project to construct hydro plants upstream of the Biobio river (Ulianova et al, 2012: 205). This movement is important because for the first time the news covered the anti-dam struggle in Chile. Orrego and his associates' activism was oriented to conservationism, but also to defending the Mapuche-Pehuenche indigenous communities which, however, finally were displaced from the area after the Pangué (1995) and Ralco (2004) mega-dams were constructed and flooded their ancestral lands in the Biobio river basin (see Figure 6.3 above). The dams were supported by the World Bank and the Chilean government but against the consent of the Mapuches-Pehuenche people. During their resistance against the dams proposed by ENDESA, two Mapuche sisters, Berta and Nicolasa Quintreman—popularly known as the *hermanas Quintraman*—transformed into the indigenous symbol of resistance against ENDESA during the 1990s and early 2000s. They fiercely resisted and used all means possible to stop the project. One of the Quintreman sisters, Nicolasa, even made a speech to the National Congress in Valparaiso (1998) to request that the state stop the project. Nonetheless, the Quintraman sisters finally had to accept the agreement made between the state and ENDESA, basically a “compensation” (money) for their ancestral lands. However, only one year later the Ralco dam was operative, and Nicolasa even had a meeting with the President Ricardo Lagos in Santiago (2005) accusing ENDESA of breaches in the agreement (La Tribuna de Biobio, 2005). The relevant point is that the Quintremans' resistance to ENDESA-Spain marked a tipping point in Mapuche

communities that during the late 1990s were beginning to articulate demands to recuperate their ancestral lands located on the southern Biobio river, which had been dispossessed by the state and its army in the second half of 19th century and onwards (Klubock, 2014). Sadly, but also ironically, Nicolasa was found dead (drowned) in the artificial lake created by the Ralco dam in December of 2013 (Radio Biobio, 2013). Her death is being claimed as an example for Mapuche environmentalism (c.f. Montalva et al, 2014) in the context of the current Mapuche movement struggles against both hydropower and forestry corporations in southern Chile (Montecinos, 2014; Klubock, 2014: 268-297; Torres et al, 2016; El Ciudadano, 2016). In particular, she is known for her message: “Nature gives us everything we have, we understand that everything we have is sacred” (Nicolasa Quintreman, 1999)¹²⁴. This Mapuche ecologism is key to understanding the environmental movement in Chile: nature is sacred and therefore should be respected in its natural balance.

Meanwhile, as the Chilean government strongly supported these dams, Juan Pablo Orrego created international networks to support the Mapuche-Pehuenche struggle against ENDESA. In this task, he was the 1997 Goldman Prize Winner¹²⁵. The same year Sara Larrain created the *Programa Chile Sustentable* (Chile Sustainable Program), which is based on the previous RENACE experience, and it began to give life to this political-ecological project, which joined up with other old and new NGOs. It remains as one of

¹²⁴ My translation. Original in Spanish: “La naturaleza nos da todo lo que tenemos; nosotros entendemos que todo lo que tenemos es sagrado”, cited by Namuncura, 1999, p. 7

¹²⁵ See <https://www.youtube.com/watch?v=27Pf0TBg3Ag>

the most important environmental and anti-dam movements until today (Programa Chile Sustentable, 2016). They have been attempting to influence both the institutional (mainly at the levels of the state and parliament) and socio-cultural (through grass-roots movements) arenas of socio-environmental changes in the country. Their main targets continue to be the neoliberal policies applied to environmental commons (Ulianova et al, 2012: 197-198).

As the above examples highlight, environmentalist and conservationist organizations such as the *Grupo de Accion del Biobio* and the *Programa Chile Sustentable* were from the very beginning connected with international networks who have supported and financed their process of creating national and local networks to defend rivers from being dammed by hydroelectric geographical projects. These international networks have received much more media attention and coverage since the 2005 campaign against dams in Patagonia, in which the multibillionaire American conservationist Douglas Tompkins and other American NGOs such as International Rivers were among the main financers of this campaign against the joint venture of ENDESA and COLBUN in the Patagonian river basins (Carmona, 2011). I observed and participated in the deployment of the “Patagonia without Dams” campaign in the Aysen region during some fieldwork that I did for my Master’s dissertation (Torres, 2008). In particular, during the summer-fall of 2007 (January-May) I was able to get involved with different individuals and groups participating in the campaign, in which I realized that an important portion of them were foreigners and Chileans but from outside the Aysen region, like me. This was seen with different degrees of skepticism by local people, especially those living in the area in

which dams were going to be constructed, such as Cochrane, Tortel and other Patagonian villages in the Baker river basin. At the early stage of this hydro project (2006-2008), many Patagonian people were inclined to support the mega-dam projects, principally because HidroAysen offered job opportunities and supposedly chances to obtain cheaper electricity bills. The latter is important because in Patagonia electricity is much more expensive than in central Chile (Torres et al, 2009), which unlike Aysen region, is completely connected to the SIC (Figure 6.1 above). In addition, HidroAysen used a series of extra-legal methods as a strategy to “internally divide the communities” by offering to cover certain material needs of local people. For instance, they offered college scholarships, and cash to improve tourism accommodations, among others “mechanisms of compensation” to Patagonian communities (Torres, 2013). It was within this context of the ENDESA/COLBUN strategy for legitimizing their mega-project among the communities of the Aysen region in which some of these communities being benefited with “compensations” were, understandably, not very sympathetic to the movement Patagonia without Dams. However, this situation changed gradually when local young Patagonians (especially college students) organized their own groups of opposition to the HidroAysen project (Torres, 2008). This local group—the so called “*Jovenes Tehuelches*”¹²⁶—also joined the campaign *Patagonia sin Represas* and gradually began to convince to their parents and the older Patagonian people to reject the dams (Torres, 2008). This illustrates how Chilean anti-dam activism is trans-class and is composed in significant part by “millennials”, students, and young professionals.

¹²⁶ Honoring to the *Tehuelches*, one of the main indigenous groups who inhabited originally the Patagonia. See Martinic, 2005.

In this way, the campaign against the dams in Patagonia was constructed by joining an increasing and complex network of international, national, and local environmental organizations, including CODEFF, International Rivers (California), the Natural Resources Defense Council (USA), RENACE, *Ecosistemas* (NGO funded by Juan Pablo Orrego sometime during the early 2000s), *Conservacion Patagonica* and *Fundacion Pumalin* (Tompkins' NGOs), among others. Environmentalist campaigns against dams in Patagonia can be considered the first meaningful cross-scale joining of the environmental movements in Chile, which grouped together more than 30 environmental organizations from the country and around the world. The new scalar cooperation of environmentalists defending Patagonia from large dams was called the *Consejo de Defensa de la Patagonia Chilena* or Council for the Defense of Chilean Patagonia (Rodrigo et al, 2007: 176). For the purposes of this chapter and my overall analysis, one of the most important achievements of the anti-dam movement in Patagonia was to put in the public eye and create public awareness of the fact that ENDESA also was the main owner of non-consumptive water rights in Patagonia and the country, themes that until then were not publicly known (cf. Larrain et al, 2010; Orrego, 2013). In this sense, the impacts of the campaign against dams in Patagonia were gradually scaling up on different fronts, from the institutional court demands and processes, up to the street protests and direct action politics not only in Aysen but also in the country, especially during the national scale student revolution of 2011 (c.f. Atria et al, 2013; Orrego et al, 2016). This growing opposition affected the reputation of the HidroAysen project in national public opinion. For instance, in 2007 36% of the Chilean population was against dams in Patagonia, a statistic which increased to 74% in 2011 (Carmona, 2011). The campaign against dams in

Patagonia also coincided with growing hydrosocial metabolic rifts occurring in the river basins of the northern and central parts of the country. Also, it coincided with the reforms made in 2005 to both the Water Code and the Electric Law, which as I said above, triggered a series of new hydropower projects in Chile seduced by the high profits allowed by the law, profits that are being paid monthly by the Chilean families through their electricity bills. These processes have also been generating new internal differentiations in the Chilean environmental movement, evolving from traditional conservationism/environmentalism to specific anti-dam and water movements. Although all these activists' micro-politics have unfolded as particular struggles against specific geographical projects (hydro, forestry, agribusiness, mining, etc.) (Larrain et al, 2010), since around one decade ago activists also have been articulating their locally based defense of the environment with others' ongoing regional and national hydro-struggles. Overall, I observe a gradual strengthening in civil society, indigenous (Mapuche), and environmentalist agenda to reconstruct the old notion of water as public good or commons in a new historical form (Larrain, 2012, 2015; Mundaca, 2014).

3.3 Outlining water commons governance: hydropower projects and anti-dam scalar politics in the Nuble and Maipo river basins

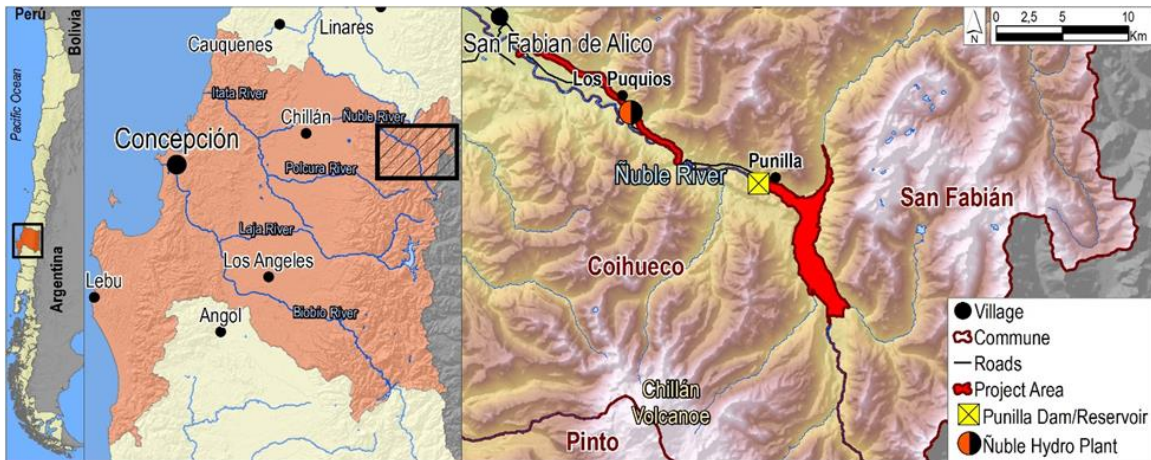
Two other examples of these local struggles taking place at regional, national and international scales are those arising from the ongoing Punilla and Alto Maipo hydro projects. In the first case, the environmentalist agenda is opposed to the agenda of the state, irrigators and hydropower corporations promoting a large dam/reservoir and other run of the river hydro plants upstream of the Nuble river basin. In the second case,

activists are opposing to the hydroelectric agenda pursued by the alliance between global and national corporate power that since December 2013 has been constructing a run of the river hydro mega-project upstream of the Maipo river. In what follows I analyze both cases, highlighting the different ways in which these hydro projects which are located in different regions illustrate my whole arguments about how both anti-dam and water commons scalar politics are generating a new way of thinking about water management at the river basin and national scales. The agenda of water commons is based on both institutional and direct action politics, all accompanied by new cultural depictions of nature, water, forests, and whole ecosystemic processes including the way in which humans and markets have created the current hydrosocial metabolic rifts and alternatives to restore these rifts. I analyze these environmentalists' contributions in the general context of democratizing the water governance processes among the state, corporate power, campesinos, indigenous people and civil society groups.

Punilla dam/reservoir & Nuble hydro plant in Biobio: water dream or water nightmare?

Punilla reservoir is the old water dream of irrigators from the Nuble river basin (chapter 4), which according to them is the main way to obtain water security to irrigate their agricultural lands located in the central valley of the Nuble river basin (Figure 6.4).

Figure 6.4 Punilla dam/reservoir & Nuble Hydro Plant in the Nuble river basin, Biobio region



Source: Center for Environmental Sciences EULA-Chile

Consequently, irrigators grouped in the Junta de Vigilancia of the Nuble river are the main proponents of this almost century old water project. Punilla was approved in November 15 of 2010¹²⁷, and then raised as a priority piece of water infrastructure by the Bachelet administration within the context of 2014 Water Reform (chapter 5). In effect, Punilla was included in the whole package of “reservoir projects” that made up the “water infrastructures” of the 2014 Water Reform, a strategy that includes both small and

¹²⁷ *Resolucion de Calificacion Ambiental* (Environmental Qualification Resolution) or “RCA” Number 18/2010 (RCA 18/2010), available at: http://seia.sea.gob.cl/seia-web/ficha/fichaPrincipial.php?modo=ficha&id_expediente=6295. This resolution was issued by the Environmental Commission of the Biobio Region after the revision of the Punilla project’s antecedents presented by the DOH (Ministry of Public Works) through its Environmental Impact Assessment (EIA). The Environmental Commission of Biobio (and each region in the country) is composed of a “committee that that includes the Regional Governor [*Intendente*], the Regional Director of the SEA [Environmental Assessment System, SEA by its acronym in Spanish], and regional representatives of several ministries. Each of these evaluators is appointed by Chile’s president, a fact that has raised concerns about the committee’s ability to take independent decisions that are technically free from political pressure imposed by the executive” (Susskind et al, 2014: 454). These observations are relevant for Punilla given that this water project is promoted by the Ministry of Public Works through the DOH. For a critical review on the functioning of the SEA in relation to hydroelectric projects, see Susskind et al, 2014, pp. 453-458

large reservoirs¹²⁸. For this reason, it was not a surprise that in December 3 of 2014 irrigators and the Ministry of Public Works (through the DOH) signed the “*Convenio Operación Embalse La Punilla*” (The Punilla Reservoir Operation Agreement), by which irrigators finally achieved state approval for their old water dream and so the construction of the Punilla reservoir was initiated (Ministerio de Obras Publicas, 2015b)¹²⁹. This project proposes to construct a mega-dam that eventually will have a wall 136 meters high, by which it will have a capacity to store around 600 million cubic meters of water (Ministerio de Obras Publicas, 2015c). To do so, 1,752 hectares will be flooded in the Andes Mountains up to the Chillan volcano (Figure 6.4, red area). The other small red area below corresponds to the run-of-the-river Nuble Hydro Plant (*Central Nuble*), which was approved in 2011¹³⁰ and which will produce 136 MW to be distributed though the SIC. Since 2014 the Nuble hydro plant has been in the process of being constructed by Electrica La Puntilla, the hydroelectric company controlled by the irrigators of the Sociedad del Canal del Maipo from Santiago. It is estimated that it will be operational by 2017¹³¹. In its irrigation purpose, the Punilla reservoir is intended to increase the

¹²⁸“We will build small reservoirs in areas with major problems of water scarcity. This potentially will benefit 8,000 farms with a total of 17,000 hectares. The [construction of the] first small reservoir starts over the next year and we hope to build 15 small reservoirs in the next 4 years. In addition, we will start the bidding, concession and operation of Punilla Reservoir in the Ñuble Province, to provide irrigation water to the area”. Bachelet (2014), pp. 20-21

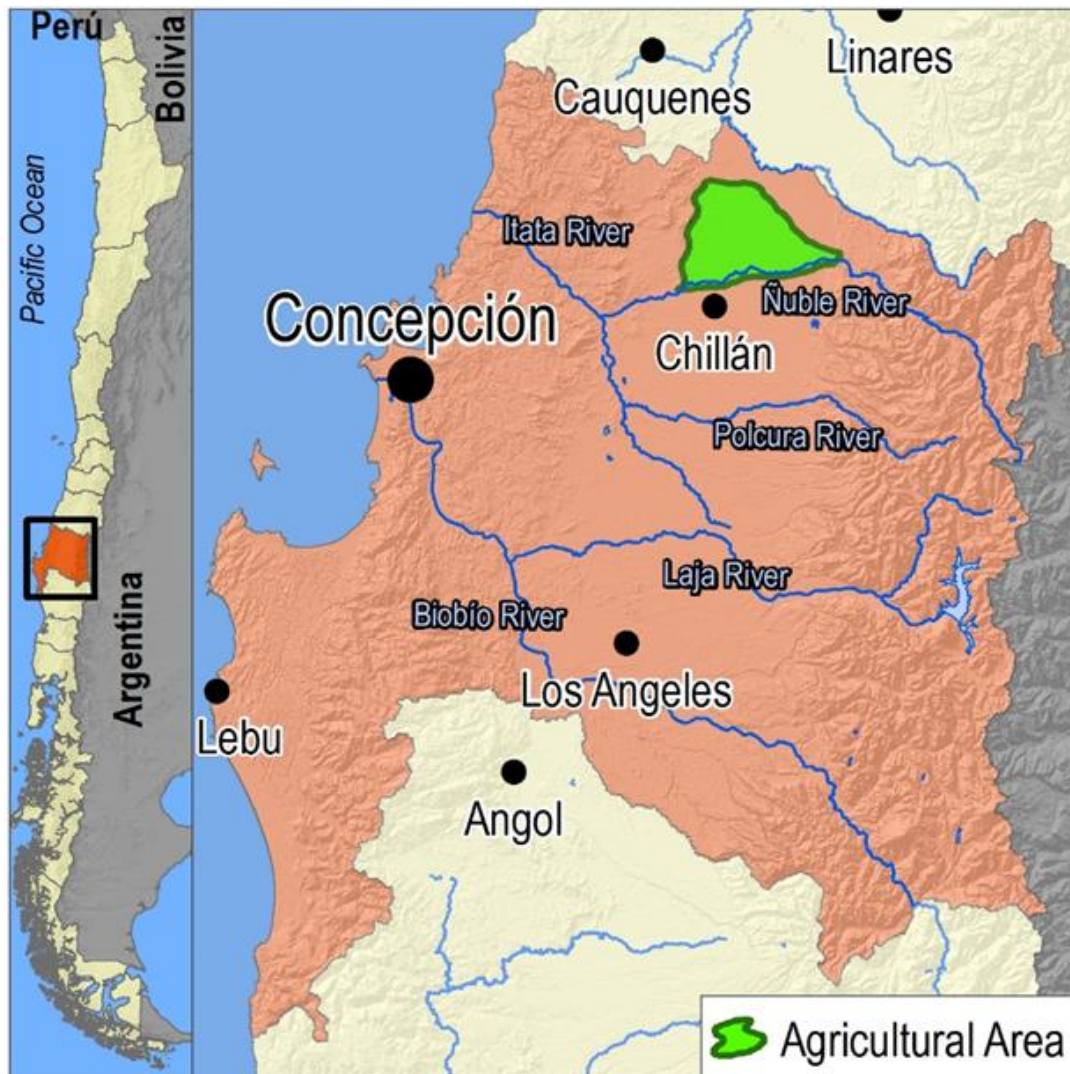
¹²⁹ Margarita Letelier, President of the *Junta de Vigilancia rio Nuble*. Presentation at the Seminar “Reforms to the Water Code: the vision of Water User Organizations”, organized by the Law School of the Catholic University of Chile. Santiago, December 2 of 2014

¹³⁰ RCA 218/2007, Available at: http://seia.sea.gob.cl/archivos/EIA/2013121701/EIA_1461391_DOC_2128941241_-1.pdf

¹³¹ See the company’s website: <http://www.electricapuntilla.cl/centrales-2/>

irrigation surface to 10,000 hectares in order to reach the 70,000 hectares with an “irrigation security of 85%” (Ministerio de Obras Publicas, 2015b). These agricultural lands are located in the central valley up toward the north side of the Nuble river (Figure 6.5), for which the state will allocate water rights for that 10,000 additional hectares (Ministerio de Obras Publicas, 2015b).

Figure 6.5 Agricultural area to be benefitted by the Punilla reservoir



Source: elaborated with data from the Ministry of Public Works, Center for Environmental Sciences EULA-Chile

This means around 31,364 additional water shares to be *sold* to irrigators by the state (around three water shares per hectare). From this total, 21,221 water shares will be for “current irrigators” who belong to the Junta de Vigilancia of the Nuble river, that is, irrigators who already are consumptive water right holders. The rest of 10,143 water shares will be sold to “new irrigators”. During my fieldwork in the Fall 2014 I interviewed irrigators from the Nuble river basin that already have in their hands an “Application Form” that was delivered to them by the Junta de Vigilancia of the Nuble river. In this form, they would eventually sign an agreement to buy units of the surplus water shares that will be produced by the Punilla reservoir. Here one can observe that although the Punilla reservoir will be constructed by the state under a public-private alliance with both irrigators and the concessionaire company (see below), all the hydrosocial process around Punilla have being framed under the dominant water market-oriented approach. In this scheme, the mechanisms for the allocation of water rights from the Ministry of Public Works (DOH) to irrigators via DGA reproduces the market system that dominates the current model of water governance: the selling/purchasing of water rights. In this case and based on the previous analysis (chapter 4 and 5), I would predict that only irrigators with the economic power to buy water shares will be able to buy and then “use, enjoy, and dispose” of these water shares. Although some irrigators, particularly peasants, said that there will even be accommodations for paying the water shares (monthly payments, etc.), many of them also said that they would never buy more water shares because they cannot afford them. The point is that to put the surplus water produced by the Punilla mega-dam under the market laws is a clear reflection of the current neoliberal policies over water, which are profoundly embedded in the state and

irrigators' cultures. Even within the water reform of Bachelet, these market mechanisms are completely alive and even being reinvented to adapt to the new configuration marked by growing water scarcity and hydrosocial conflicts.

This market approach to governing the hydrosocial process in the Nuble river basin is, then, contributing to deepening the current water market system instead of overcoming it. The Bachelet reform is seemingly radical (in the eyes of irrigators) but in practice it is just another market driven environmental policy (to the eyes of environmentalists). Why is it so difficult to imagine a water governance process beyond the market? I think that this dominant pathway based on the dictatorship of the water markets is blocking the possibilities of creating more democratic and sustainable ways to allocate water rights among irrigators and especially campesinos, for instance, according to their socio-productive needs and not according to their economic power. For example, under these market mechanisms, surplus water from Punilla could easily be appropriated by a few agribusinesses and other large/medium size companies, who once they have appropriated the water rights could begin new large (and unsustainable) geographical projects to the detriment of small (and more sustainable) agricultural projects led by small peasants and campesinos. The experiences of the pork industry (chapter 5) and the Laja lake system (see above) are illustrative of this.

The picture is more complex when we integrate future hydropower production. In January 2016 the Italian hydro-corporation Astaldi Concessioni E.R.L adjudicated the concession to construct and operate the Punilla reservoir/hydropower plant (Fernandez, 2016). This hydropower plant will produce 93 MW, and here is the core problem: how will this company coordinate with the Junta de Vigilancia for the uses of the reservoir?

Do not forget that in the 1981 Water Code there aren't clear rules of governance in this respect. However, according to the Agreement signed in December 2014 by the DOH and irrigators (which Astaldi Concessioni E.R.L must respect), irrigation will have "priority over other services to ensure irrigation security in 85%" of the central valley (Ministerio de Obras Publicas, 2015b). Notwithstanding this formal agreement, in the Biobio regions the experience of irrigators from the Laja river basin and their historical conflicts with ENDESA are well known, and for that reason many irrigators from Nuble also observe with skepticism the character of this "multi-purpose" mega water project. This configuration creates uncertainties, and it will be an eventual future hydrosocial conflict among irrigators, the state, and the transnational company Astaldi Concessioni E.R.L. However, that is only a likely future water conflict, because all these processes surrounding the design and implementation of the Punilla project have already generated many opponents represented by local people and the environmental/anti-dam movement, called *Nuble sin Represas* (Nuble without Dams)¹³².

This movement claims that Punilla, and also the Nuble hydro plant, will destroy the environment and displace local people from their plots, dispossessing them from their traditional forms of life associated with agriculture, mountain and nature tourism, and other cultural practices developed over decades (and even centuries) of living in the area. In the upstream Nuble river there are no Mapuche communities like in the Biobio river basin. Rather it is mainly traditional peasant families who live there. During the last

¹³² See the movement website: <http://www.xn--ublelibre-k6a.cl/>

decades, the arrival of both foreign and Chilean individuals who have been buying lands from local peasants to use them as residential plots and/or small tourism enterprises has been observed. In effect, the Punilla project contemplates expropriating 1,105 hectares, displacing (“re-locating” according to the government) 72 families living in the area that will be flooded (Ministerio de Obras Publicas, 2015d). During my fieldwork I interviewed Alejo, one of these peasants whose land is being expropriated by the state and who is obligated to leave the area because of Punilla¹³³. For Alejo, this displacement was always in his thoughts because the Punilla project, as a historical water dream of irrigators living downstream of the Nuble river, has always been in the conversations and imaginations of the people living in the area. What is a dream for Nuble’s irrigators, for Alejo and his people has been a long nightmare that now has finally become a reality: his land was expropriated by the Ministry of Public Works in 2014. His plot is located in the middle of the flooding area of the Punilla reservoir. When I visited Alejo to interview him I was fascinated by the beautiful scenery in the area, completely undammed until now and full of native forests and wild rivers, in which there are also native fauna species like the *huemul* (south Andean deer) and *pumas* (Andean lion). The peace from these Andean mountains is what Alejo said he was going to miss so much once he is gone. Alejo said that Punilla is ‘violence’, this was the word used by him to describe the act of being displaced. He is part of the family’s third or fourth generation to live in the area, whose ancestors arrived in these mountains late in the 19th century. Since then, this peasant family has based their household economy mainly around raising animals (cows,

¹³³ Interview conducted in sector El Sauce, commune of San Fabian in October 11 of 2014.

goats, and chickens, among others), and he has complemented this with subsistence crops, mainly beans, wheat, and other grains. During the last two decades they have also worked providing tourist services to visitors, such as riding horses, hiking, and other activities in the Nuble river. In the Andean mountains, water is not only for irrigation and hydropower but also for leisure and nature tourism.

According to Alejo, the government offered to “relocate” them in houses that eventually will be constructed for displaced families in the village of San Fabian de Alico. Alejo said: “this place in which I live cannot be compared with any other place” because he has a whole family history inscribed in his plot, in the river, in the mountain, in the forest, with the animals, the air, the freedom, and the privilege of living in a clean and exuberant environment like these Andean mountains. Alejo said: the government has no idea the value that this environment has for us. Of course, Alejo is not talking about the environment as exchange values, but he refers to the use value of this natural, pristine and shining natural environment. However, the market arrived to this area to transform these natural mountains and water into profits. The plight for Alejo and his family is that their plot is so small (almost 3 hectares), so then the money that they will receive from the expropriation is not going to serve to buy another place with the same characteristics. Similar arguments were made by the Quintraman sisters during the 1990s against ENDESA: the Biobio River Mountains were sacred ancestral places for them, but for the government and the hydro-corporation they were only lands to be flooded and squeezed for profits. In the case of Alejo, the state expropriated their lands, bringing official appraisers from the government who established the “value” (price) of their plots but

only by considering their market value, not their historical, cultural, and other subjective values that Alejo and his people have attached to this astonishing Andean place, “because the real damage is that I have to leave this place. They cannot pay that with cash”. During my interview, Alejo also emphasized that he and other displaced peasants from this area have organized a group to present their demands to the government. This small group of around 20 families was made to differentiate itself from what Alejo depicted as “foreign people” in reference to some environmentalists, residential plots, and tourism entrepreneurs who live mainly in San Fabian de Alico village. These people, who for Alejo are “*gente de afuera*” [outsiders], have arrived during the last decade or so from cities like Santiago, Chillan, San Carlos, and even from foreign countries. Similar to ENDESA/COLBUN in Patagonia, according to Alejo, what the government was trying to do is “to divide our community” by offering different prices for lands by individual cases instead of negotiating with all of them as a group. Alejo defined his 20 family groups as those living “upstream of the future wall”, that is, from the wall toward the east in direction of Argentina. According to Alejo, people like him living upstream from the future wall are the ones who are “suffering the real pain” and the threat of being displaced, while many (but not all) people living “downstream” of the future wall are trying to obtain economic benefits from the other hydro project (run-of-the-river Nuble) by selling their lands at the highest prices possible. Alejo said that he and his group do not even want to sell anything because they actually do not want to leave their plots and quiet way of life. “We do not want the reservoir because the damage is not payable. This damage is not only for us: can you image all the [damage] to nature? [...] But maybe nature will react to all these projects because near here we have the Chillan volcano”.

In this point, the “peasant environmentalism” of Alejo coincides with the “activist environmentalism” proposed by members of *Nuble sin Represas*. This water movement is actually composed of local and extra-local people, the majority of them young rural workers, tourism entrepreneurs, students, and professionals. Before I traveled to San Fabian I was able to get a telephone interview with an important key informant, Alicia, who once I arrived there introduced me to both Alejo and this water movement against hydroelectric development in the Nuble river. Alicia was instrumental in allowing me to penetrate the social networks of local people against the Punilla and Nuble hydro plants because as the stories related by Alejo demonstrate and the state criminalization of activism (see below), there are strong suspicions among locals toward unknown people who arrive asking about their activism. In effect, corporate power attempting to divide and fragment communities seems to be a core strategy from the side of hydro corporations who want to gain local sympathy and support for their mega geographical projects. In effect, what Alejo described as the government’s attempt to divide his community (negotiating individually with each one of them), can be seen as a deliberate strategy to generate distrust and divide the communities, offering more money to buy the land of some of them while offering less to others. In my experience with the HidroAysen project in Patagonia I observed similar processes but in that case it was undertaken by ENDESA/COLBUN: providing cash and others incentives to some members of the communities in order to get support for the project, which in turn generated deep divisions among the families and members of the peasant communities (Torres, 2013).

However, peasants like Alejo are being strongly supported and defended by members of *Nuble without Dams*. For the members of this water movement, the hydro projects that are attempting to dam the still free Nuble river are simply a crime against nature because they will block the natural flows of rivers, and that blocking is depicted as a destruction of the river basin and its surrounding environment. According to Lito, who was born in San Carlos but who has lived since early 2000s in the San Fabian de Alico village, “we always use a metaphor here or we do see it this way: rivers are the veins of the earth. If you build a wall, you are forming a clot. The same thing happens in the human organism or body. When you have a clot, yes you can have a heart attack and it hurts you. It can even can produce thrombosis. At these moments, the earth is suffering this thrombosis because how many rivers on the planet are not being blocked?”¹³⁴ To avoid this happening in the Nuble river and even knowing that both hydro plants are already approved and under construction, these anti-dam activists deploy strategies in both institutional and direct action politics in order to stop these projects.

In the most quotidian of direct actions, these types of movements develop a series of strategies that in light of the ongoing construction of the Nuble hydro plant, include surveillance of the trucks from the companies working in the area, in order to check that they are really meeting their environmental agreements proposed in the Environmental Impacts Assessments by which their projects were approved (RCAs). In doing so, direct action includes photography of the water works and construction companies’ trucks that

¹³⁴ Lito and Juane, group interview conducted in San Fabian de Alico, October 22 of 2014

eventually can serve as means of proving accusations made in the courts. However, these direct actions also involve the collective creation of materials to help to disseminate information on the struggle against dams. It is a sort of anti-dam logistic that includes the creation of a logo, websites, Facebook and other social media pages, magazines, brochures, posters, t-shirts, and triptychs to better communicate their arguments against the hydro projects in the Nuble river basin communities and beyond. I had the opportunity to be present in a regular meeting of this water movement in which I was able to observe the strong collaborative attitude of their members to producing these types of material as a means for their struggle against the Punilla and Nuble hydro plants. All these materials also serve to disseminate their activities, which are beyond only protests and marches, which are important but not the only strategy. These include the organization of the *Nuble Fest* every year (which in 2015 celebrated its 10th anniversary) and other cultural and artistic activities, which are intertwined with tourism activities in the river and natural environment. The activists of Nuble without Dams are thinking of long term sustainability. They are completely aware that the market dictatorship can only be fought by promoting environmental education and creating consciousness in children and next generations, beginning at the home scale and then scaling up to the schools in the community and so on. The strategy is to educate these new generations under this idea of defending and protecting the local environment from these large geographical projects, not only hydropower but also forestry and other foreign funded projects that arrive in their communities trying to transform their natural endowments into capital flows and profits for national and transnational corporations. They know the struggle is a

long process, but the only viable one that can allow them to continue enjoying their free river and a sustainable form of life in the community of San Fabian.

Like in Patagonia, their struggle also began in trying to convince the most traditional peasants that hydro projects like Punilla are not in their best interests, as they usually think they are because they focus on job opportunities in the construction stage and local supplying of services for the companies and workers (foods and restaurants, accommodations, brothels, and so on). In the process, they have scaled up their agenda at the level of community. They understand that there are powerful forces behind these hydro projects (the state, irrigators, hydro-corporations), but they have strong hope fueled by their conviction that in the search of the alternative for the market, they are not alone. Here is where the commons hydro-modernity project shows its lights beyond the market dictatorship. As noted by Juane, “Everywhere other movements are already emerging, consolidating, so to speak, that are not guided by the idea of competing with the current [market] system because this is not a competition. Simply, they are new flows of people who are shifting from one system to another. I think that it will be a spontaneous process, and as Lito said, this will take some generations to change and become a new stage of human development”¹³⁵. From a water governance perspective, this approach means that environmentalists do not want to participate in the current market logic that dominates the scene in the nation: rather they are proposing an alternative pathway, which can also be offered as elements to be incorporated in a more sustainable water governance process at the community scale, which is perhaps the most important and socially meaningful of

¹³⁵ Lito and Juane, group interview conducted in San Fabian de Alico, October 22 of 2014

all the scales. These alternatives are being constructed with other environmentalists because in the process of developing these concepts and practices, Lito and Juane and many other members of the water movement Nuble without Dams also have participated and joined together with water movements elsewhere. They have done so principally by actively participating in the National Protests for the Recovering and Defense of Water deployed by dozens of water movements that, like them, have joined these national scale experiences of marches and protesting for water which have developed since 2013. Among these movements is also “No Alto Maipo”, the opposition against the hydro project in the Maipo river basin.

Alto Maipo hydro project in Santiago

Unlike the Punilla project proposed by the state and irrigators, Alto Maipo is a private initiative proposed by the American AES-GENER Corporation. This water project was approved in 2009 (RCA 256/2009) and it consists in a run of the river hydroelectric mega-project, which will use the waters from the upstream tributaries of the Maipo river (El Yeso and Volcan rivers). It seeks to construct long tunnels of almost 70 kilometers in length in the Andean mountains to transport the water, which will be extracted through two “bocatomas” (one in the Volcan river, the other in El Yeso river) and then transported through a pipeline installed in the Andean tunnels, which finally will discharge the water in the Colorado river. There will be two hydro plants located there that will jointly produce 531 MW: Alfalfal II (264 MW) and Las Lajas (267 MW)

(Figure 6.4). As the Colorado river is also a tributary of the Maipo river, the company proposing this project argues that the Maipo river will not be affected in its flow amounts.

Until the moment of its approval in 2009, the project was completely an initiative of AES-GENER, but between 2011 and 2013 this situation changed. In June of 2011 the Pinera government, through CORFO, sold 29.98% out of the 35% of participation that the state had held until that moment in AGUAS ANDINAS. This is the private corporation that controls and manages the water from the El Yeso Reservoir, the main source of potable water for the more than six million people living in Santiago city, and that is located just above the second “bocatoma” of the Alto Maipo project (Figure 6.6).

Figure 6.6 Alto Maipo project area in the Maipo river basin, Santiago region



Source: Center for Environmental Sciences EULA-Chile

El Yeso Reservoir was constructed between 1953 and 1967 and created a reservoir with the water of the El Yeso river and has been operational since 1964. It was constructed with the same objective as Punilla, that is, “to provide greater irrigation

security to an extensive irrigated area of about 100,000 ha in seasonal and inter-annual variation”, but also “to ensure the supply of potable and sewerage water to Santiago” (Sandoval, 2003: 57). It is 62 meters high with a capacity to store 250,000,000 m³ (or 250 Hm³). The reservoir was envisioned to irrigate around 120,000 hectares of the Maipo basin but gradually more than 20,000 hectares have been urbanized (see chapter 4). Between 1993 and 1999, El Yeso Reservoir was transferred to *the Empresa Metropolitana de Obras Sanitarias* (Metropolitan Sanitation Company) (EMOS by its acronyms in Spanish) (Sandoval, 2003: 57). This company was created in 1977 as part of the restructuring of the sanitation and potable water public companies that until then operated supplying their services to urban areas¹³⁶. The transfer of El Yeso Reservoir to EMOS was done because the irrigators from the Maipo river basin refused to pay part of the construction costs of the El Yeso reservoir (Sandoval, 2003: 57). In parallel, under the presidential period of Eduardo Frei Ruiz-Tagle (1994-2000) the privatization of the water services (potable water, sewage, wastewater treatment) began (Larrain, 2012: 84-87)¹³⁷. In this context, in 2001 the process of privatization of EMOS began. EMOS then changed its name to Aguas Andinas (El Mercurio Online, 2001). The privatization was

¹³⁶ In effect, in 1977 the Pinochet administration decided to restructure the potable and sanitation sector at a national scale. To do so, the *Servicio Nacional de Obras Sanitarias* or National Sanitation Services (SENDOS) was created. SENDOS grouped and concentrated all the previous public institutions providing potable water and sanitation to urban populations, among them, the *Empresa de Agua Potable* de Santiago created in 1861 (see Piwonka, 1999), the *Dirección de Obras Sanitarias* (created in 1952), among others. SENDA established one sanitary/potable water company for each region, being EMOS the company created for the Metropolitan Region of Santiago. See Celedon et al (2004)

¹³⁷ It is a historical irony that Eduardo Frei Montalva, the father of Eduardo Frei Ruiz-Tagle, was the one who nationalized the water in 1967 in the context of the agrarian reform, and precisely 31 years later, his son began the privatization of water services in the nation. Both father and son are reflections of the main, fundamental periods of socialist and neoliberal hydro-modernity that have experience Chile during the last fifty years (1967-2016)

consolidated in 2008 when the Spanish corporation Aguas Barcelona (Agbar) (in turn controlled by the French-Belgium Suez Environment Group) achieved the control of Aguas Andinas (Fazio, 2010: 199-200). According to the environmentalists and water movements grouped in the campaign “No Alto Maipo”, Aguas Andinas opposed the Alto Maipo project. However, this began to change from June of 2011 onwards precisely after CORFO sold 29.98% of its 35% of participation in Aguas Andinas (Osorio, 2015). The Chilean Luksic group acquired 4.42% of participation in this sale, which allowed Luksic to be a member in the directory of the biggest urban water corporation in the country (a critical view in Weissman et al, 2011). However, this participation ended in March of 2016 when the Luksic group sold its 4.44% of participation in Aguas Andinas. It was a brief but profitable investment (Orellana, 2016). Beyond the profitable hydro-business made by Luksic in the process—which only confirms market dominance in water affairs in the country—the relevant aspect of this analysis is that according to environmentalists, once Luksic began to participate on the Board of Aguas Andinas in 2011, the company changed its opposition to Alto Maipo and it began to support it (Osorio, 2015). Moreover, the Luksic group also played with other alternatives around the Alto Maipo project. The most important one occurred in June of 2013 when AES Gener announced it was selling 40% of the project Alto Maipo because they lacked financing. This was a percentage that was acquired completely by the Luksic Group though one of its mining companies called “Antofagasta Minerals” (La Tercera, 2013). The deal included that once operational, AES-GENER would sell 160 MW out of the 531 MW (30%) of power that Alto Maipo hydro plants will produce to Luksic. Luksic needs this energy to feed its main mining

project in northern Chile: *Minera Los Pelambres*, which is located in the Coquimbo region (Ibidem).

This has been the context that has helped to delineate the growing resistance against the Alto Maipo hydro project. The first protests against the project were made exactly during 2011, in the broader context of the re-birth of national protests and strikes led by the student movement. In effect, the student movement made a revival or new wave of National Scale Protests, which were absent in Chile since the 22 National Protests were held in the period of 1983-1987 (Salazar, 2011). Water movements such as Patagonia without Dams and particularly No Alto Maipo began to be fueled by this national scale explosion of different social movements spreading the rebellion against the widespread processes of accumulation by dispossession of natural commons and other social rights “usurped” by the neoliberal project (Mundaca, 2014). In this struggle, the already existing camaraderie among different NGOs and anti-dam movements across the country like Patagonia without Dams and Nuble without Dams have also been stimulating the movement against the hydro plants in the mountains of Santiago.

For the water movement against Alto Maipo, all the mentioned businesses made by Luksic are unacceptable because the activists argue that Luksic has used his privileged position as one of the top five powerful Chilean families/economic groups to force the construction of the Alto Maipo project. When a transnational corporation like AES-GENER sold 40% of its holdings to Luksic, AES-GENER was not only obtaining a partnership to finance its hydro-geographical project. They were also investing in the political influence that a local group like Luksic exercises in the Chilean state and political-ecological processes in the river basins, specifically prompting the

state to promote and privilege the mega-projects of hydroelectric development. This is similar to the strategy used by ENDESA-Spain with COLBUN in the HidroAysen project in Patagonia: an alliance with member of local elites to obtain the political support of the state to facilitate the final approval of their initiatives.

However, here there is a tricky and interesting process. When Bachelet took office in March of 2014, one priority was to convene a *Consejo de Ministros* (Ministers Council) to decide the future of HidroAysen because in those times the project was of high political priority because of the social, environmental but also corporate pressures on the state to make a decision. As I already said in chapter 1, the Ministers' Council decided to reject the HidroAysen project in June of 2014. Although voices within the environmental movement are cautious and they do not like to consider this as a “triumph”, this can be seen as significant achievement in the historical development of Chilean environmentalism and anti-dam movements. In fact, it is the first one that has succeeded in stopping a large scale dam project (2,750 MW).

In a certain way, the cautious voices within environmental movements are relevant. For the multiplicity of water movements composing the No Alto Maipo and grouped into the *Coordinadora Ciudadana Rios del Maipo* (Citizen Coalition for the Maipo River Basin)¹³⁸, Bachelet's decision to designate Domingo Pacheco as the Ministry of Energy in March 2014 was the first signal. This was so because in Chile it is publicly known that Pacheco has personal and professional links with the Luksic family. For instance, he participates in the directory of companies owned by Luksic, such as

¹³⁸ See the movement's website: <http://www.riosdelmaipo.cl/>

Luchetti and Banco de Chile (Carmona, 2014; El Desconcierto, 2015). In September of 2014, Pacheco made the preferences of the Bachelet government regarding hydro power development explicit: they promote it¹³⁹. In any case, this is an energy politics aligned with the *Ley Corta II* enacted by President Ricardo Lagos in 2005 (Bauer, 2009). Pacheco said publically that the hydro plants of the Alto Maipo project “already are being built, there are more than a thousand people working and I requested that the owners [of the project] accelerate their construction because we expect to inaugurate this hydro project in 2017” (Carmona, 2014).

All this public support from the side of the state authorities to a private hydro project is seen as provocation by No Alto Maipo and other environmental/water movements. Because of its strategic location in the Metropolitan Region of Santiago, it is not surprising that the movement against the Alto Maipo hydroelectric project has been a core movement grouping the other water movements from the rest of the country demanding a new water policy. Since 2009, these movements are grouped together in the Coordinadora de Defensa del Agua y la Vida (Water and Life Defense Coordinator) (Larrain, 2012)¹⁴⁰. It was in these scenarios of growing hydro-struggles around the Alto Maipo hydroelectric project in which dozens of other water movements developed the first national march for the defense and recovery of water downtown Santiago in 2013. Here the anti-dam movement began to converge metabolically with the growing

¹³⁹ This can be found in the program “Energy 2050” deployed as a participatory process by the Bachelet government through the Ministry of Energy, which in December of 2015 approved the new Energy Policy for Chile. See this and other news about “Energy 2050” at <http://www.energia2050.cl>. For an environmentalist critique to this program, see Programa Chile Sustentable et al, 2016

¹⁴⁰ See the Coordinadora website at <http://www.derechoalagua.cl/>

movements attempting to recover water as a commons. A sample of movements participating in the historical reconstruction of water as a commons is shown in Chart 6.3

Chart 6.3 Development of Environmental, Anti-Dams, and Water Movements in Chile

MOVEMENTS	SECTOR/s	REGION/s	Year
Comité Pro Defensa de Flora y Fauna (CODEFF)	Conservation	Aysen/Biobio/+2	1968
Instituto de Ecología Política (IEP)	Multi-sectorial	Santiago	1987
Red Nacional de Acción Ecológica (RENACE)	Multi-sectorial	National	1988
Grupo Acción del Biobio	Multi-sectorial	Biobio	1991
Programa Chile Sustentable	Multi-sectorial	National	1997
Coordinadora Arauco-Malleco (CAM) (Mapuche)	Forestry	Biobio/Araucanía	1998
Ecosistemas	Multi-sectorial	National	2000?
Consejo de Defensa de la Patagonia Chilena (Patagonia Without Dams)	Hydropower, Agriculture, Tourism, Conservation	Aysen	2005
Ñuble Libre y Sin Represas (Ñuble Without Dams)	Hydropower, Agriculture, Tourism, Conservation	Biobio	2005
Semillas de Agua	Multi-sectorial	National	2006
Movimiento Juntos por el Agua (Pork Industry)	Agriculture, Agribusiness	Santiago	2007
Coordinadora de Defensa del Agua y la Vida	Multi-sectorial	National	2009
Campesinos por la Tierra/Exonerados y Torturados Políticos de la Reforma Agraria	Agriculture, Forestry	Biobio	2010
Coordinadora Ciudadana Ríos del Maipo (No Alto Maipo)	Hydropower, Agriculture, Drinking Water, Tourism	Santiago	2011
Movimiento Nacional por la Recuperación y Defensa del Agua	Multi-sectorial	National	2011
Movimiento por la Defensa del Acceso al Agua, la Tierra y Protección del Medioambiente (MODATIMA)	Agriculture, Mining, Agribusiness	Valparaíso	2011
No a Monsanto	Agriculture, Agribusiness	Various	
Asamblea del Agua y Soberanía de Puente Alto	Hydropower	Santiago	
Colectivo Viento Sur	Multi-sectorial	Santiago	
Colectivo La Savia	Popular/Urban	Santiago	
Fundación Habitar	Multi-sectorial	Santiago	
Observatorio Ciudadano	Multi-sectorial	Santiago	

Source: own elaboration based on my fieldworks in Patagonia, Biobio and Santiago. Also: Rodrigo et al

(2007); Larrain et al (2010); Vilanova et al (2012); Mundaca (2014); Chile Sustentable et al (2016); Torres et al (2016)

During my fieldwork in 2014, I had the chance to participate in two water protests organized by No Alto Maipo in which participated many of these other water movements. There the members of No Alto Maipo and other movements emphasized this articulation and scalar politics of environmental and water movements in the nation for defending water and territories from the state captured by capitalist elites. For environmental and water movements, the state and governments in alliance with global and local corporations are the main entities responsible for the threats that large geographical projects like Alto Maipo put to whole river basin ecosystems. For No Alto Maipo activists, Bachelet government is returning favors to Luksic and other local elites because they finance their political campaigns¹⁴¹. As the activists against the hydro plants in the Maipo River have not received serious attention from the state, they have continued with parallel actions in the courts (El Desconcierto, 2016)¹⁴², but also direct action politics. The latter, for instance, through road cuts in the commune of San Jose de Maipo in order to impede the circulation of trucks that are already working in the construction of the Alto Maipo project. Their goal is to delay the transport of machinery and inputs of materials to the hydro plants (Asamblea del Agua y Soberanía de Puente Alto, 2014). The state has answered these direct actions with repressive politics. Activists accuse the state of using the repressive apparatus of Special Forces of the uniformed police

¹⁴¹ Marcela Mella, Spokewoman from the Coordinadora Ciudadana Ríos del Maipo, Discourse pronounced in the March and protest to reject the Alto Maipo project, San José de Maipo (La Obra Village), October 24th of 2014

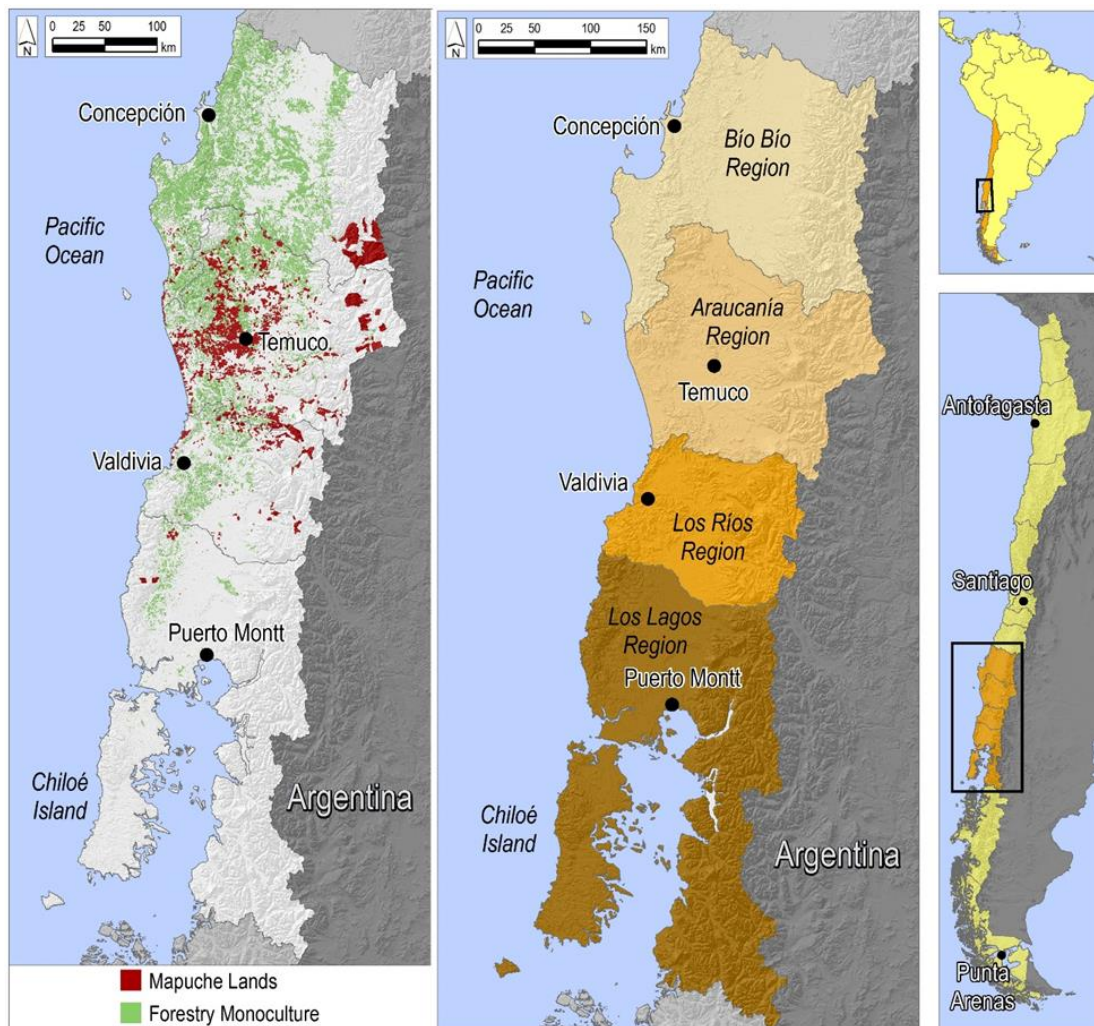
¹⁴² By March 24 of 2016, the movement No Alto Maipo have accumulated 14 lawsuits in different environmental and civil courts in Chile against the Alto Maipo project. Their goal is that the Government revoke the RCA that approved the project in 2009. However, these lawsuits have not been taken into account until now. See El Desconcierto (2016)

(*Carabineros*), threatening to use the Anti-Terrorist Law enacted by Pinochet in 1984 if they do not stop their actions oriented on preventing the hydro plant construction (Ibidem).

This despotic state power to suppress social movements is not new. During the student revolution of 2011 and the protests against HidroAysen, repressive actions coming from the state were on television and in other mass media daily. The time of the Pinochet dictatorship was even worse, of course. The most extreme demonstration of this despotic state power against socio-environmental movements, however, is the practice since the late 1990s against the Mapuche movement, gradually criminalizing their radical and moderate actions to recover their lands and dignity (Bengoa, 2012; Klubock, 2014; Torres et al, 2016). This has happened because, since then, Mapuche communities—particularly the youth Mapuche generations from both the Biobio and Araucania regions—have decided to recover their ancestral lands dispossessed first by the state and then, during the 20th century, by forestry corporations. Today, these corporations (CMPC, Forestal Arauco) are among the primary owners of the lands that (before 1881) belonged to Mapuche. Today, an important portion of these lands is covered with forestry monocultures of pines and eucalyptus that have created water scarcity and growing hydrosocial metabolic rifts, which have practically surrounded the Mapuche lands in southern Chile (Figure 6.7). As for Mapuche, the land, water, and the entire environment are sacred and they cannot be exploited as commodities for corporate profits. Since the late 1990s, they have begun a strategy of direct action politics that includes the takeover of forestry estates. Moreover and similar to No Alto Maipo and other water movements, Mapuche also uses other institutional actions in the courts to put pressures on state

apparatus to defend their demands in the democratic and institutionalized spaces of political struggles (Torres et al, 2016). From my perspective, the Mapuche movement that conveys all the Mapuche cultural ecology (Montalva et al, 2014) and ancestral legacy inscribed deeply in the popular and Chilean culture are key to contributing to building the water commons agenda for a more sustainable and democratic water governance in the 21st century.

Figure 6.7 Forestry monocultures and Mapuche lands recognized by the State in southern Chile



Source: Torres et al, 2016

For the Mapuche, what is at stake in their socio-spatial struggles against both the state and corporate power (mainly forestry but also hydropower) are the very roots of their cultural practices and survival as an ethnic group. For the agenda of democratizing water governance processes, I also think that Mapuche environmentalism offers deep notions of sustainability that have not been fully explored nor considered in any analysis until now. Therefore, there is further research to be done in this area (Torres et al, 2016).

It is perhaps because of this growing convergence between Mapuche environmentalism struggling against the state/corporate bloc, on the one hand, and broader water movements in the same situation like No Alto Maipo, on the other, that has allowed them to interact and create national hydrosocial networks. For instance, not only have the Mapuche participated in the national water protests in Santiago (2013-14) and Valparaiso (2015) to recuperate water as a commons , but also in protests organized by No Alto Maipo in Santiago. A representative statement of the Mapuche critique is “it is not possible that President Bachelet goes abroad to lobby politically with our territory, with our water, with international companies [...] we are here to defend life, we defend our territory”¹⁴³. This collaborative alliance between Mapuche and environmental/water movements in Chile has matured and now they are undertaking collective actions together. For instance, the Fourth Pluri-National March to the Recovery and Defense of

¹⁴³ Mapuche woman, representative of the Puel Willi Mapu Territorial Alliance, extract from a speech at the “March for Water and Against Alto Maipo” developed in Santiago downtown, December 13 of 2014, cited in Torres et al, 2016, p. 137

Water was carried out in Temuco city (Araucania Region) in April of 2016¹⁴⁴. This initiative is not only socio-spatially and politically relevant to the strengthening of the hydrosocial networks and alliances among environmental/water movements pursuing the water commons agenda in the nation, but it is also socio-ecologically relevant because 90,000 out of the 400,000 peasants living without water in the country are located in the Araucania region (Delegacion Presidencial de Recursos Hidricos, 2015: 44). Like in Biobio, the hydrosocial metabolic rifts in Araucania are mainly produced by forestry development and they are affecting particularly Mapuche communities.

All these conflicts between the state, corporations (both hydropower and forestry, but also mining in the center-north), and water movements are showing a growing convergence among local and national scale movements. Although the state's response to the protests has been characterized by the repression, the multi-scale water movements are defending themselves to avoid that their demands and political agenda for water commons be delegitimized and criminalized by the repressive state apparatus and official propaganda. In this respect, these socio-spatial struggles around water and the environment are evidence that the state is defending and protecting the interest of private corporations to the detriment of communities. This is typical in a neoliberal governmentality regime and similar to the critique made by irrigators regarding the privileged treatment of hydro corporations by the state. Environmentalists and activists

¹⁴⁴ Movimiento por la Defensa y Recuperación del Agua (2016) Hacia el Encuentro Plurinacional por la defensa de las aguas y los territorios, March 16. Available at <http://aguaenmarcha.cl/wp/encuentro-plurinacional/>; El Ciudadano (2016) Comienza el “Encuentro plurinacional por la recuperación y defensa del agua”, April 23. Available at: <http://www.elciudadano.cl/2016/04/23/278997/comienza-elh-encuentro-plurinacional-por-la-recuperacion-y-defensa-del-agua/>

also claim that these hydro corporations receive privileged treatment by the state. In this case, there is a convergence between environmentalists/water movements and irrigators. In effect, one of the main arguments of the movement against Alto Maipo is that these hydro plants and large tunnels in the Andes are threatening the supply of water to irrigate agricultural lands located in the central valley of the Maipo river basin. They also argue that Alto Maipo threatens the supply of potable water for the seven million inhabitants of the Santiago city, principally because one bocatoma is located in the El Yeso Reservoir (Figure 6.4 above). As I already mentioned, this reservoir is the main water reserve to serve the Santiago population and it is operated by another large corporation, Aguas Andinas, which controls around 43% of the drinking water supply in the country.

Activists also have begun to use science against Alto Maipo. In alliance with the *Colegio Médico de Chile* (Medical Association of Chile), in February of 2016, they presented study results that shows evidence that the water works associated with the construction of the Alto Maipo project have polluted the water in the mountains of Santiago. Therefore, Alto Maipo would seriously threaten the provision of clean water for both human consumption and irrigation in the Maipo river basin (Tchernitchin, 2016; Larrain, 2016). Overall, the social, environmental, anti-dam and water movements have deployed street protests, legal, scientific and also direct actions against the geographical projects to which they are opposing to.

In addition, environmentalists also maintain the original peaceful spirit of the Chilean environmental movement. They organize protests and marches which are

peaceful and treated as a family activity, which includes children, the elderly, and cultural activities such as music, visual and material arts, carnivals, *batucadas*, and so on. In effect, the marches for recovering water as a commons are truly collective parties full of colors, creativity and joyfulness. The idea is to avoid the confrontation with the police, but the principal objective is to demonstrate and gradually convince to other actors (state, politicians, civil society, municipal actors, etc.) that these water struggles are defending the life of both people and the environment, and, therefore, they are worthy of being supported. Like in Nuble, the political agenda of water commons in Santiago emphasize the environmental education to the new generations and the strengthening of communities' networks as the most important strategies to scale up this movement and gradually to begin to put in practice the water commons hydro-modernity. The following statements reflect the strategies of families and communities to develop this hydrosocial agenda to the 21st century.

“Puente Alto slowly is rising up, organizations and students from different schools already know these themes. Once we have all these young people aware about the water problems, for sure Puente Alto will mark a milestone and will be an important linkage in this struggle that depends on all of us, neighborhood associations, labor unions, everyone has to go out and fight!”¹⁴⁵

¹⁴⁵ Jorge, representative of the Asamblea del Agua y Soberanía de Puente Alto, extract from a speech at the March and protest to reject the Alto Maipo project, San José de Maipo (La Obra Village), October 24th of 2014

“Our time is now, that's why I bring my children, because I always say the same, when they be old, they will be able to say- my mother went out and she struggled for the [seeds and food] sovereignty of this country. Instead, who is in the house watching TV, What's going to respond when s/he has no water, when s/he has no seeds? What the fuck are they going to answer to their children? They will have nothing to say, they will have to shut up and look down and us, brothers, we will be able to look straight and high.”¹⁴⁶

The scalar politics of environmental and water movements are in opposition to state/corporate politics of accumulation by dispossession, production of hydrosocial metabolic rifts, and deployment of the repressive state apparatus that aims to criminalize these social movements. Although broadly speaking environmental/water movements support the 2014 water reform and the “constitutional process” undertaken by Bachelet in 2015, they reject the state continuity with the market dictatorship applied to water governance and the environmental commons. The strategy is then to democratize the state and re-orient it toward a national agenda of water commons in a more egalitarian and democratic way. However, this agenda is resisted by irrigators and corporate power, although they differ in reasons and even they have had conflicts among them, as the Laja Lake case demonstrates. But it is undeniable that corporate power controls the state and they defend the neoliberal agenda for governing the environment according to the market laws. Nonetheless, in light of the growing hydrosocial metabolic rifts and environmental destruction produced by neoliberal hydro-modernity, I think that the democratization of water governance at river basin and national scales is a necessary process that will be

¹⁴⁶ Patricia, peasant and activist against GMO and No a Monsanto, extract from a speech at the March and protest to reject the Alto Maipo project, San José de Maipo (La Obra Village), October 24th of 2014

unavoidable in the 21st century already underway. Environmentalists have produced a new and deep challenge to the commodification of nature. Water for the environment, communities, and last the markets. That is the kind of sustainable and democratic water commons hydro-modernity to be constructed during the next decades.

CHAPTER 7

CONCLUSIONS AND FURTHER RESEARCH

My research experiences meeting and interviewing campesinos, peasants without water, large farmers, state and municipal public officials, environmentalists, and the broad spectrum of water subjects participating in water governance processes in Chile, demonstrate that social and political processes matter in water affairs. The historical-geographical and multi-sited ethnographic development of hydrosocial relations analyzed in this research show that social power and water are intertwined in different ways according to the historical moment, development strategies, and the hydro-climatic conditions in a certain socio-spatial configuration. In reconstructing the Chilean hydrosocial metabolism, I discovered that water can be framed in different ways according to the political ideology and modernity projects (e.g. Liberal, Keynesian, Socialist, and Neoliberal) of the ruling the state apparatus and, therefore, shaping the fate of the nation and its natural environments. I was prompted to inquire empirically into the fundamental idea that specific geographical projects (Harvey, 1996) produce certain socio-natures and, therefore, they also shape the uneven geographical configuration of different hydrosocial assemblages (Smith, 2008; Swyngedouw, 2015).

I analyzed the development of three sectors (forestry, irrigation, and hydropower) that use and control water resources in the country and, therefore, are constituent elements of the configuration of hydrosocial assemblages and uneven development. In the research process, I gradually discovered that these socio-economic sectors have been affected by the political ideologies of development produced by the different stages of the

hydro-modernity. That is, they produce different political-ecological projects oriented to supply water to people, transforming them into subjects with the right and access to water, the most elementary emblem of citizenship in modern times (Bakker, 2010). In this research, I have highlighted that in neoliberal hydro-modernity, water as the modern emblem of citizenships is being jeopardized by large geographical projects (especially forestry) coupled with growing water scarcity associated with climate changes.

The Chilean case also demonstrates that hydro-modernity is an accumulative process influenced by historical patterns of development. The current neoliberal hydro-modernity stage operated since 1981 cannot be understood without considering the analysis of the previous socialist (1970-73), Keynesian (1880s-1970), and Liberal hydro-modernity projects. In fact, these types of hydrosocial assemblages are not pure but rather hybrids (Swyngedouw, 2015). Evidently, from all the hydro-modernity types, the neoliberal one is the most important for the today hydrosocial transformation not only in Chile but globally. As this research demonstrates, the current stage of neoliberal hydrosocial assemblages have contributed to create growing water struggles in the regions of Biobio and Santiago, transforming not only the traditional practices of water management of local people but also the way in which they have been dispossessed of their direct access and control of their traditional water sources (surface and ground water). These transformations have produced growing social discontent that have triggered the development of environmental and water movements claiming to recover water as a commons. These movements are the main social forces engendering different processes oriented to democratizing water governance in the country.

From all these histories, my doctoral research has made a contribution to the field of political ecologies of water in three main (theoretical and practical) areas: a) The political ecology of geographical projects, b) The hydrosocial metabolic rifts of development, and 3) The exploration of emancipatory and alternative hydrosocial assemblages beyond the neoliberal hybrid, particularly through the notion of water as a commons.

1. The political-ecology of socio-environmental projects

In this research, I have reconstructed the main features of historical development of certain geographical projects in the center and south of Chile. The thesis of Harvey (1996) that all geographical projects are also political-ecological projects became illustrated through the analysis of irrigation development as the most ancient hydrosocial assemblage existing in the country. As I demonstrated in chapter 4, although canal development has ancestral indigenous roots in Santiago, it was gradually developed since colonial days but it finally consolidated during the 19th century. These developments were mainly conducted by land owners in alliance with political power controlling the nascent liberal state (1833-1925) (Salazar, 1985, 2012). However, there were some critical stages in which the state began to expropriate water from irrigators in the name of the public interest. The cases of the canalization and urbanization of the Mapocho river at the end of the 19th century and the recent 2014 Bachelet reform show that the controversies among the private and public notions of water are centenary and they must be analyzed in that historical-geographical perspective. In this respect, my analysis of irrigation development in its different historical forms (liberal, Keynesian, socialist, neoliberal) is far to be complete. My main interest is to continue exploring in further

research the processes of urbanization of water and agricultural lands, particularly in the Santiago region, as a relevant process that allows the understanding of broader issues of irrigation, urbanization, and uncertainties associated with water sustainability in a context of climate change (Larson et al, 2015). For instance, the disputes among irrigators and the state, institutional changes, but also the adaptation of irrigated agriculture to growing water scarcity. The socialist hydro-modernity deployed by the government of Salvador Allende deserves future specific research to understand in a better way the agrarian changes operated with the nationalization of water during that important transformative period. The remaining campesinos CORA and the regularization of their water rights are an important issue that still is connecting the current neoliberal with previous socialist hydro-modernity. This also confirms that the hydrosocial assemblages are hybrid natures. Finally, further research on how water user organizations have accumulated experiences and knowledge through the different forms of hydro-modernity is relevant to understand the internal diversity of irrigators (from large farmers to campesinos and sharecroppers) and how their forms of social organization can contribute to the transformative processes that are challenging the traditional notion of water as a private property in which they are embedded as the main group of consumptive water right holders in the country. The cultural change in irrigators as a way to contribute to more egalitarian water governance processes at the scale of communities and the state is an important theme for future inquiry because there is a big gap of socio-environmental research in this area.

The socio-ecological relationships between irrigation and hydroelectric developments are also relevant. Although hydroelectric natures also need to be explored internally in

major details in its different stages of hydro-modernity, according to my research results (chapter 6), the most relevant stages are the Keynesian (1943-1989) and neoliberal (1989-2016) hydro-modernity. During these decades, hydroelectric development has begun to interact with irrigators and their water user organizations. The conflicts among irrigators, hydropower corporations, and the state are an important area to continue exploring, particularly because there include the two types of water rights existing in Chile (consumptive and non-consumptive). This analysis is also relevant because current hydro developments such as Punilla and Alto Maipo demonstrate that past experiences of conflicts between hydro corporations and irrigators (e.g. Laja lake case) have not been fully taken up in these ongoing water projects. In Chilean neoliberal hydro-modernity, hydropower is a privileged player (Bauer, 2009) that has received opposition from both irrigators and environmentalists but they have been supported strongly by the state. The state preference for hydro technologies is then an area to be explored in more details.

Like irrigation and hydropower, forestry also was deployed as a large scale geographical projects but mainly in southern Chile, specifically the Biobio region as the core geographical area in the country containing forestry development. Like hydropower, forestry development also experienced the process of Keynesian hydro-modernity conducted by the state, the nationalization during the socialist hydro-modernity, and then privatization during the subsequent neoliberal hydrosocial metabolism. These processes evidence multiple disassembling and reassembling in the ways of governing hydrosocial metabolism through these large geographical projects. However, unlike irrigation and hydropower, forestry development was envisioned as part of a broader geopolitical

project directed by the state and supported by the army to take control of Mapuche lands southern Biobio (Bengoa, 1985; Klubock, 2014). In addition, current neoliberal forestry development is producing water scarcity (Torres et al, 2016) by expanding the hydrosocial metabolic rifts in both Mapuche and non-Mapuche peasant communities (chapter 3). Therefore, further research on the specific ways by which forestry plantations and industries produce water scarcity, and the uneven socio-spatial distribution of this scarcity and other environmental degradation processes, is important to create new indicators of this socio-ecological relationship. It is also important to explore the interactions between forestry and irrigation developments, particularly in the Biobio and other regions that are densely forested (Torres et al, 2016)

Overall, the socio-ecology of geographical projects inspired by the critical geography of Smith, Harvey and Swyngedouw is an important conceptual device to understand how the natural commons have been gradually transformed into commodities in the transition across the different hydro-modernity projects. The Chilean case demonstrate the thesis that all the socio-environmental transformation are produced by socio-natural, organic, human, non-human, but ultimately by political and corporate elites deploying investments and the production of new natures through their appropriation of the state apparatus and commodification of nature (cf. Smith, 2008; Harvey, 2003, 2014, Swyngedouw, 2015)

2. The hydrosocial metabolic rifts of development

Precisely, hydropower but mainly forestry geographical projects are the main drivers of what I have termed the hydrosocial metabolic rifts of development. The theoretical

ideas of the environmental sociology of Foster (2000, 2009) and the critical geography of Harvey, Smith and Swyngedouw found here a heuristically interesting application in the current Chilean water crisis. The forestry development is producing water scarcity, but this water scarcity is also dispossessing the peasants that historically have inhabited the rural areas. Here the forestry project is also organically interacting with agricultural activities, some of them irrigated. The forestry development is also interesting to continue investigating because similar to hydropower, since its inception in the early 20th century has enjoyed a privileged treatment from the side of the state, what also demonstrate how the state has been historically captured by corporate power, particularly during the last stage of neoliberal forestry.

The hydrosocial metabolic rifts of development are unevenly distributed in socio-spatial terms. In neoliberal hydro-modernity, campesinos are the main losers because statistically they are the main group within the 400,000 people living without water in Chile (cf. Delegacion Presidencial de Recursos Hidricos, 2015). As their long term geographical project to be independent producers demonstrate (chapter 4), the dispossession of their direct access and control of their artisanal water sources (small wells, Rural Potable Water, among others) can be read as an historical continuity in the politics of social domination and dispossession operated by landlords, new agribusiness and, indirectly, by the state. In this sense, one of the most interesting research areas is to inquire ethnographically on how campesinos are experiencing these processes of water dispossession, and the different ways in which they are adapting and creating new forms of water community management to cope with this new hydrosocial configuration. Their

traditional cooperatives and committees of Rural Potable Water (APRs), characterized by a vision of water as a use valued to satisfy human consumption, is also an important area of future research. In particular to conduct new hydro-ethnographies to understand existing democratic ways to manage water at the community scale in rural areas. In relation to this, these processes should also consider the relations of conflicts and cooperation with the state (both central, regional, and municipal), which in light of these metabolic rifts is also experiencing a growing governmentalization (cf. Foster et al, 2010; Bakker, 2010). In effect, the governmentalization of the Chilean state in water affairs is maybe showing the future developments beyond the current neoliberal hydro-modernity. It is also showing how the state is the core space of democratic disputes to pursue the socio-spatial agendas of different water subjects.

3. Reassembling the hydrosocial metabolism: For an emancipatory hydro-modernity

In effect, the contradictory roles of the Chilean state in water governance processes can be understood as different social interests trying to control it. On the one hand, water user organizations and corporate power promote and defend the socio-spatial agenda of water markets (business as usual). On the other hand, growing groups of campesinos without water, Mapuche, NGOs and a multiplicity of environmental and water movements are promoting the agenda of water commons (an emancipatory project). I think here is the core water struggle among the different stakeholders analyzed in this research. Environmental and water movements are the most radical social groups promoting the transition to a more sustainable and democratic way to govern the

hydrosocial metabolism. Irrigators (mainly large farmers) have a traditional viewpoint but gradually they are beginning to negotiate their market-led approach in the light of the growing hydrosocial metabolic rifts. However, the most powerful actors represented by corporate power (forestry, hydropower, mining...) both transnational and national are the most extreme defenders of neoliberal hydro-modernity because, as is apparent, they have a very profitable business extracting value from the environment, and therefore, they are located at the opposite extreme of environmentalists and water movements. The latter is gradually constructing an emancipatory project that I have termed commons hydro-modernity. By emancipatory I mean a socio-spatial project that seeks to surpass the neoliberal water market in which has dominated the Chilean hydrosocial process. A water market is usually depicted as the only way to governing water, a claim strongly contested by communities and environmentalists. The water commons project defends the agenda of water for the environment and for people as the fundamental goal, coupled with a new democratic an egalitarian way to manage natural commons, in which water cannot be considered a commodity because is the most essential element for life (Bakker, 2010). Human and non-human life cannot be subordinated to the endless capitalist accumulation and market laws in the new commons thinking. The contamination and depletion of both surface water and aquifers in the Itata and Maipo river basins analyzed in this research show abundant evidence about this rapacious neoliberal hydro-modernity and the need to overcome it.

In this respect, I am interested in continuing a line of research on the different types of environmentalists and water movements in Chile and elsewhere. The Mapuche

movement is of particular interest because it is the most radical socio-environmental movement in the country, having as their main targets forestry corporations in the dry lands and hydropower corporations in the upstream river basins (Biobio and southern cases). Mapuche is also a philosophy and form of life in which nature is sacred and therefore, it is only a use value and cannot be considered as a commodity. This anti-capitalist Mapuche environmentalism (Torres et al, 2016) represents perhaps the most profound notion of sustainability to be explored and detailed in further research. I also want to continue exploring the Mapuche scalar articulation with the other hydrosocial movements in order to continue developing an empirically grounded notion of water commons. I think a clearer notion of commons hydro-modernity will convince more people in the deliberative and democratic processes that are beginning to appear in the light of the ongoing water crisis. As I demonstrated in chapter 5, Chilean irrigators demand a clearer notion of “public interest” in order to support these transformative processes at the state and community scales. Interdisciplinary research on environmental/water movements but also campesinos without water can refine in a better way this notion and thus create new convergences and alliances among stakeholders at the river basin and national scales. An interesting issue here is to explore how people without water rights—urban populations, majority of peasants—can be integrated into the new water governance processes that are emerging from the current water crisis.

I conclude this doctoral research by saying that commons hydro-modernity is perhaps the most important socio-spatial project to reassembling the Chilean hydrosocial metabolism in a more democratic and sustainable way. Although it will contain elements

of the previous liberal, Keynesian, socialist and neoliberal hydrosocial assemblages, it will overcome them to create a new historical form of hydrosocial hybrid. This does not mean ignoring real processes still subsumed under the neoliberal hydro-modernity and broader processes of accumulation by dispossession (Harvey, 2003). It means to take into account these market-led processes, but also to consider seriously the alternatives, its antithesis of development.

In an international perspective, the Chilean case is an important lesson in how water privatization and the market dominance in managing natural commons under climate change can produce severe environmental degradation and promote monopoly corporate power over this vital element (cf. Bauer, 2015). The Chilean case also shows how difficult is to reverse both the lack of democratic water governance and the environmental degradation produced by large geographical projects conducted by global corporations under a market logic. Neoliberal hydro-modernity problems cannot be solved with more market-led policies over water and natural commons. In sum, the Chilean case is an important lesson on how an extreme model of neoliberal water management is not sustainable, and that in turn is an opportunity to focus both research and actions on the growing socio-ecological legitimacy of the commons hydro-modernity projects that are already appearing and spreading at all scales. The hydro-commons era has already begun in Chile and elsewhere (cf. Carrozza et al, 2016)

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APPENDIX A
ON THE SELECTION OF RESEARCH SITES

When I defended my doctoral research prospectus in April 2014, I proposed a multi-sited ethnographical approach (Marcus, 1995) to study water struggles in Chile. The research sites chosen were Biobio and Aysén because of my previous research experiences in both regions. Briefly, from 2006 to 2012, I participated as a Masters student and investigator in different water research projects based in the University of Concepcion (UdeC, Biobio) and the Research Center on Patagonian Ecosystems (CIEP, Aysén), where I focused mainly on conflicts associated with reservoir and dam projects, ecotourism, social aspects of irrigated agriculture, integrated water research management (IWRM), and water governance problems.

Principally, I selected Aysén because during one decade (2005-2014) there was a proposed mega-dam project (HidroAysén) that was ultimately rejected by the Chilean Government in June of 2014, mainly due to the strong opposition coming from Chilean society and anti-dam movements in Patagonia. This rejection of the HidroAysén project by the Chilean Government was a hard defeat to the alliance of foreign private investors (ENDESA, Spain; and ENEL, Italy) and the domestic economic elites (COLBUN, Matte group) proposing mega-dam projects for Patagonia. At the same time, however, this dam's shut-down was a great triumph for the Chilean environmental, anti-dam movement. For the first time, a mega dam project was rejected because a red-green, water social movement composed of local, national and international networks ("Patagonia without Dams"), raised social, economic, ecological and ethical arguments against the HidroAysén project. The HidroAysén rejection in June 2014 changed the scenario of water struggles in the Aysén region, which occurred only two months before I began my fieldwork. This led me to change my research plans in Patagonia because I assumed that

with the final rejection of HidroAysén, water conflicts were going to be reduced in intensity in Patagonia. This does not mean that water struggles in Patagonia are not important anymore, but they have taken on new meanings in the context of the national anti-dam movement and the broader water movement in the nation, as I demonstrated in chapter 6.

In addition, this HidroAysén rejection coincided with the fact that during the 2014 summer months (winter in Chile), I also received an offer from the University of Concepcion to contribute with my doctoral dissertation in a new interdisciplinary water research project (CRHIAM)¹⁴⁷. I accepted this offer because it is completely relevant to my own doctoral research, and more importantly, I also accepted the offer because CRHIAM contributed substantial resources to finance my five months of fieldwork in Chile.

These two events, both the HidroAysén rejection and my incorporation into CRHIAM, were the two elements that influenced me to change my research site from the Aysén region in Patagonia (Baker river basin) to the Santiago region in central Chile (Maipo river basin) (Figure 1.1). When I faced this dilemma of change my research site, I conversed by email with my doctoral advisor and committee members, who ultimately supported the decision to undertake my ethnographic interviews in Biobio and Santiago. Both regions are within the scope of CRHIAM's area, and importantly, these two regions also have intense water struggles associated with large-extractive activities. These are the

¹⁴⁷ “Water Research Center for Agriculture and Mining, CRHIAM”, Grant: FONDAP/15130015, CONICYT/Government of Chile (2014-2018), Cluster “Water and Society”. This water research center is based in the Center for Environmental Sciences EULA-Chile and other units from the University of Concepcion. The research center's main objective is to investigate and find solutions to water problems affecting two important economic sectors in Chile: agriculture and mining. Its scope is four regions—Biobio, O'Higgins, Santiago, and Coquimbo—located from the center-south to center-north, respectively (Figure 1). See http://www.crhiam.cl/?page_id=19

two main regions in the country, within which more than fifty percent of the population¹⁴⁸, economic and political power is concentrated, and importantly for this research, they have large geographical projects associated with water struggles.

¹⁴⁸ In 2014, the total population of Chile was estimated in 17,819,100 persons, 40,6% (7,228,600) living in the Santiago region, and 11,8% (2,100,500) living in the Biobio region (INE, 2014: 102)