

The Evolving Water Market in Chile's Maipo River Basin

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Case Study

Final Report on
Political Economy
of Water Markets

The Evolving Water Market in Chile's Maipo River Basin

A Case Study for the Political Economy of Water Markets Project

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Preface

This paper is one output of a project entitled “The Political Economy of Water Markets.” The project was carried out by Ecosystem Economics LLC and AMP Insights LLC. The outputs of the project include a final report and a set of case studies.

The final report comes in three parts:

1. “Healthy” Water Markets: A Conceptual Framework by Bruce Aylward, David Pilz, Megan Dyson and Carl J. Bauer
2. Political Economy of Water Markets in the Western United States by Bruce Aylward, David Pilz and Leslie Sanchez
3. Comparative Analysis of Legal Regimes with Respect to Fostering “Healthy” Water Markets by David Pilz, Megan Dyson, Bruce Aylward, Carl J. Bauer and Amy Hardberger

The eight case studies consist of the following.

1. The Evolving Water Market in Chile’s Maipo River Basin by Carl J. Bauer
2. Addressing Overallocation and Water Trade in New South Wales, Australia: Namoi Basin Groundwater by Megan Dyson
3. Evolution of Australian Water Law and the National Water Initiative Framework by Megan Dyson
4. Opportunities for Surface Water Right Marketing in Idaho’s Rapidly Urbanizing Treasure Valley by Jeff Fereday
5. Texas Groundwater Markets and the Edwards Aquifer by Amy Hardberger
6. Oregon’s Umatilla Basin Aquifer Recharge and Basalt Bank by Martha Pagel
7. Truckee-Carson Surface Water Markets in Northern Nevada by Leslie Sanchez, Bruce Aylward and Don Springmeyer
8. Smart Markets for Groundwater Trading in Western Nebraska: The Twin Platte by Richael Young

The studies and reports can be downloaded from the AMP Insights website at <http://www.ampinsights.com/rock-report>.

For further information on this work please contact Bruce Aylward at bruce@ampinsights.com.

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Introduction

The case of Chile's Maipo River Basin offers lessons to anyone interested in "healthy water markets."¹ The Maipo River is arguably the most important river in a country world-famous for its free-market approach to water rights and water management, as described below. The basin includes multiple water uses and stakeholders, and a variety of water rights negotiations and transactions.²

The Maipo River Basin

Located in semi-arid central Chile, the Maipo River flows 250 kilometers from the Andes cordillera to the Pacific Ocean through a basin of approximately 15,000 square kilometers, roughly matching the territory of the Metropolitan Region (See map on next page). The Metropolitan Region is home to more than six million people, approximately 40% of Chile's population, the large majority of whom live in the capital city of Santiago. The region contributes roughly 44% of Chile's Gross Domestic Product.

The Maipo River supplies 90% of the water for urban and residential use and 70% of total irrigation water, in addition to sustaining mining and hydropower production. The 136,000 hectares of irrigated agriculture in the basin constitute the main consumptive use of water, amounting to about 75% of the total demand. The regional demand for potable water is also significant, representing about 44% of the total national demand for drinking water. According to the General Water Directorate (DGA, for its Spanish acronym), all permanent consumptive water use rights have been allotted for the Maipo River, meaning that users must now turn to efficiency measures or reallocation in order to increase supply.

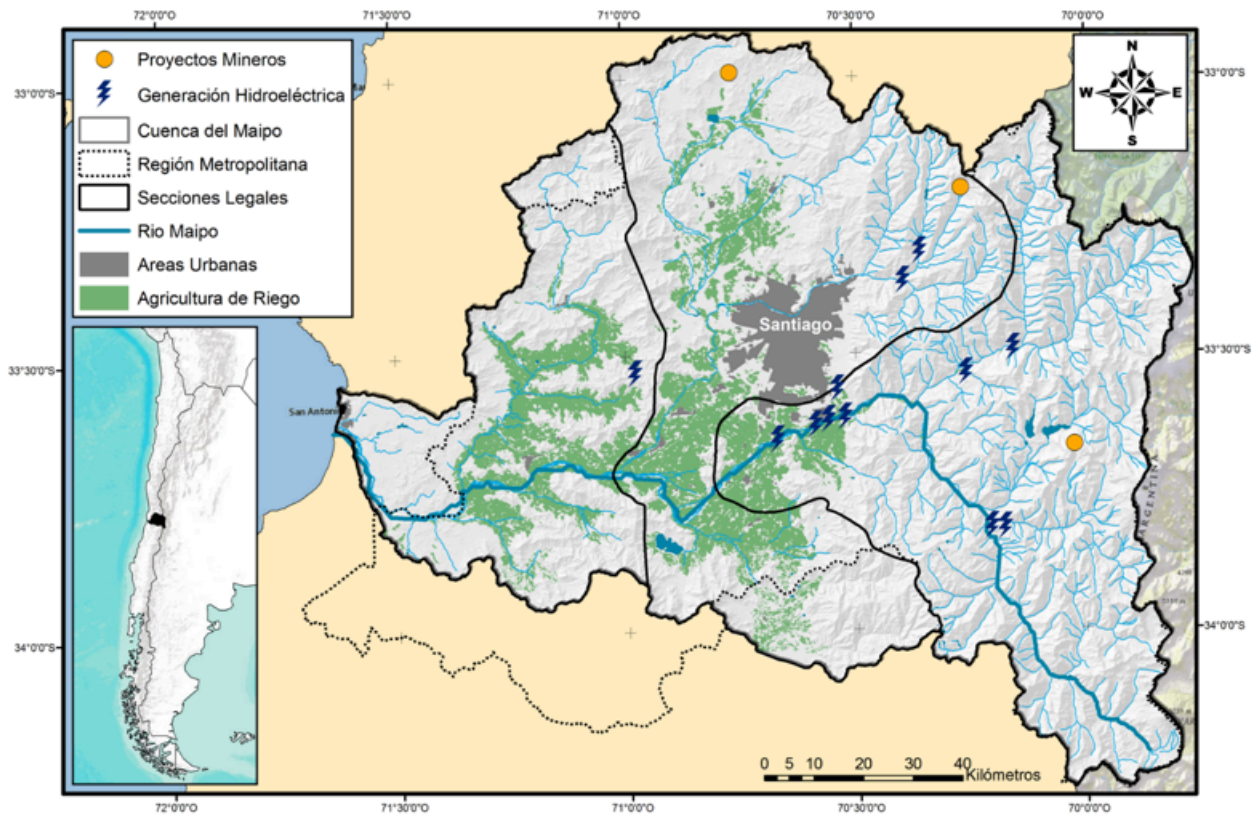
The principal provider of potable water and wastewater treatment in the urban areas of the Metropolitan Region is Aguas Andinas, a private water company owned by the multi-national conglomerate Agbar-Suez. Santiago's urban water supply was privatized in 1999 and has undergone a major transformation since the major outbreaks of water-borne disease during the 1990s. Aguas Andinas invested a billion dollars in wastewater treatment plants and reached 100% waste treatment coverage within their urban service area in 2013. Aguas Andinas now owns approximately 25% of the consumptive rights in the first section of the Maipo River. Under the supervision of the Superintendent of Sanitary Services (SISS), Aguas Andinas manages the 220-million-cubic-meter Yeso Reservoir as well as the Laguna Negra and Lo Encañado lakes

¹ Water Funder Initiative 2016.

² In this paper, much of the material specific to the Maipo case is taken from Sophia Borgias and Carl Bauer, "Trajectory of a divided river basin: Conflict and cooperation along Chile's Maipo River" (unpublished document), which in turn is based on Borgias (2016) "Law, scarcity, & social movements: Water governance in Chile's Maipo River Basin," M.A. thesis, U. Arizona, School of Geography & Development. Borgias is currently a Ph.D. student in SGD (sborgias@email.arizona.edu).

located in the mountains of San José de Maipo southeast of Santiago.

Map: Maipo River Basin (courtesy Sophia Borgias)



There are 12 run-of-the-river hydroelectric plants in the Maipo River Basin, with a total generating capacity of 324MW. About 80% of that capacity is concentrated among the five plants located in the mountainous areas of San José de Maipo, four of which are owned by the American-owned electric company, AES Gener. AES Gener is an increasingly important player in the Maipo Basin, as the company is constructing two new hydropower plants and a massive diversion scheme in San José de Maipo in order to add another 531MW, more than doubling the current generating capacity in the basin. This project, called Alto Maipo, has sparked controversy and conflict.

In legal terms, as described below, the Maipo River is divided into three “sections” (sección), numbered from upstream to downstream. Each section is considered a separate river for purposes of allocating and distributing water rights, which means that each section tends to be dry at its lower end. In the Maipo Basin, all of the major water uses mentioned above are located in the first section, except for some of the irrigated agriculture.

Water rights: Legal and institutional arrangements since 1981³

The water rights system in Chile became world-famous in the 1990s as the paradigmatic example of free-market economics applied to water. The system dates to 1981, when the current national Water Code was approved by the military regime that ruled Chile during 1973-1990. As a former Spanish colony, Chile has a long history of irrigation and water rights laws. The previous Water Code was passed in 1967, as part of a comprehensive law for agricultural land reform. That Water Code was never fully implemented, but on paper it granted sweeping authority to government agencies to allocate water and regulate its use, and it redefined all existing private water rights as government permits.

The 1981 Water Code swung the pendulum to the opposite extreme, from centralized regulation to laissez-faire. (This radical change reflected the military government's overall economic policies, which is a topic beyond the scope of this document.) In formal legal terms, Chile defines water resources as publicly owned, while the rights to use that water are private. Chilean law defines water as a "national good for public use" (*bien nacional de uso público*). This is a specific category in Chilean civil law, which also includes roads and beaches, and such goods cannot be transferred to private ownership. Water was first defined this way in the 1855 Civil Code, and the language was repeated in later legislation, including the current Water Code. The right to use water, however, is now defined as a private property right, like other kinds of real estate. Chile's Constitution of 1980 mentions water rights briefly, at the end of the article defining private property rights (Art. 19, No. 24), but says simply that all legal rights to use water are the property of their owners (with no mention of national goods for public use).

The Water Code defines private rights broadly and government regulatory powers narrowly. Water rights are separate from land ownership and can be bought, sold, transferred, mortgaged, and inherited. Water rights are not taxed, however, and owners have no legal obligation to use their rights: Chile does not have a use it or lose it rule or a beneficial use doctrine. Water rights are not tied to a specific use of water, which the owner is free to change, and the law does not prefer one kind of use over others.

According to the Water Code, water rights should be defined as a specific volume of water, as the DGA has done with rights granted since 1981. But the Code and the higher courts in Chile have also recognized water rights that were granted or legalized under previous laws, including customary rights that have never been written down, and these older rights are measured in various ways, including proportionally, i.e. as a share of changing river flows. Although there are legal procedures to "regularize" water rights by defining legal titles, this information is incomplete and often of poor quality.

Government regulations are limited. DGA, the national water agency, carries out administrative and technical functions involving water rights and resources. The most important functions are to grant new water rights and to maintain legal and hydrological records and information. The DGA is required to grant new rights to applicants if water is available, at no cost. The agency had no

³ This summary is based on Bauer 1998 and 2004.

discretion to consider other factors of public interest until the Water Code reform in 2005, by which time the vast majority of water rights nationwide had been granted or recognized. The DGA has no authority over how private owners use their water rights, nor over conflicts among them.

Conflicts among water users may be resolved by private water users' organizations, called canal associations or vigilance committees, if the conflicting parties are members. With a few exceptions nationwide, canal associations consist of farmers only and they have no authority over non-agricultural water uses. Many water conflicts, in short, go to the ordinary court system as the final arena for decision-making. There are no specialized judges or courts for water rights issues. The ordinary courts have jurisdiction but little expertise in water problems, and little interest in playing an active role.

Unlike other countries, in Chile river basin governance itself must be analyzed as part of the water market. The overall legal and institutional framework for water rights was designed to promote private property rights and markets and to restrict government regulation. As a result, water governance depends primarily on voluntary negotiation among the private owners of water rights, with the courts as backstop (in theory).⁴

Although private water rights owners are free to change or transfer their rights without DGA review or approval, the law says that they cannot injure other water rights owners as third parties. Water rights owners who allege injury from a transaction must take legal action in court. (The DGA does have power to review water rights transactions that involve changing the place of diversion from a shared river or stream.)

Another special feature of Chile's Water Code is the creation of a new kind of water rights, called non-consumptive rights. Traditionally all water rights in Chile were consumptive rights, as exemplified by farmers diverting water from rivers and using it to grow crops. Other consumptive uses include urban water supply, industry, and mining. Non-consumptive rights, in contrast, allow their owners to divert water from rivers, use it, and then return it to the river farther downstream. The purpose is to encourage hydropower development on rivers in the mountains and foothills, without reducing water supplies to farmers downstream who already had consumptive rights to the same rivers. Non-consumptive rights can be bought and sold like consumptive rights, but the two markets are separate.⁵

Non-consumptive rights have revealed two of the Water Code's most controversial aspects. First is the potential for speculation. The Water Code encourages speculation by forcing the state to grant water rights free to applicants, without charging taxes or fees over time, and without requiring any beneficial use. In fact, speculation has been much more important in non-consumptive rights than consumptive rights, largely because the category was new and therefore the rights were available throughout the country to applicants who knew the rules and were

⁴ Bauer 1998, 2004, 2015.

⁵ Prieto and Bauer 2012.

savvy. This problem was partially addressed by the 2005 reform, which imposed annual fees on owners of water rights who did not use them.

Second, non-consumptive rights have highlighted the problems of water governance and conflict resolution mentioned above. The Water Code offers few rules and little guidance about how to coordinate the multiple uses of consumptive and non-consumptive rights: the task is left to private bargaining and to water users' organizations dominated by irrigators. Multi-sectoral water conflicts must go to the ordinary courts.

Water market in Maipo River Basin: Water rights transactions

The water market in the Maipo River Basin consists of private water rights sales and transactions, both within and across water-using sectors. In the past two decades, these transactions and the resulting reallocation of water have been relevant within the agricultural sector, which is large and economically dynamic in the Maipo Basin. Most agricultural production aims at high-value crops, especially fruits and vegetables, for the Santiago metropolitan market and for export. Wine grapes and wine are major products. In addition, transactions and reallocation from agricultural to urban water uses have been important as Santiago has grown fast in recent decades. The urban population has increased dramatically and the city has expanded into the surrounding agricultural countryside.

Since the 1990s there have been a number of studies of water rights transactions in the Maipo Basin. The overall consensus is that the local water market is similar to the general pattern throughout the country: that is, permanent water rights sales are routine but infrequent, amounting to a small percentage of total water allocation⁶. Analysis of data from the Maipo Basin for the period 1993-1999 suggest a total of 793 trades, representing 1-2% of irrigation rights annually.⁷ These figures fall under 1% annually if all rights are included as the basis for the portion traded. Later data for 2005-2008 suggests a higher level of activity but annual activity, value and prices vary tremendously making generalizations difficult.⁸ Price dispersion is very high, particularly between groundwater and surface water rights, and the annual figures may be influenced by particular high value transactions or transactions in non-consumptive surface water rights.⁹

There are many factors that constrain water rights trading, including canal infrastructure that is rigid or inadequate for changing water distribution, legal titles that are incomplete or contradictory, price signals that vary widely in quality, and Chilean cultural values of farming and rural landownership. These factors are common throughout Chile, with local variations, and

⁶ Hearne and Donoso, 2014

⁷ Donoso, Montero and Vicuna, 2001

⁸ Hearne and Donoso, 2014; Cristi, 2011; Cristi n.d.

⁹ Cristi n.d.

have been discussed in depth elsewhere.¹⁰ (The Limarí River Basin in northern Chile is the exception that proves the rule: the country's only example of an active local water market, thanks to a set of unusual conditions that are not replicated elsewhere in Chile. Those conditions include adequate reservoir storage, built by the government many decades ago; high-value export crops; and well-organized private canal associations. The Limarí water market is confined to the agricultural sector.¹¹)

Because of the expansion of Santiago, the Maipo Basin has more examples of inter-sectoral water rights sales than other regions in Chile: that is, transfers from agricultural to urban water uses. Aguas Andinas has had a standing offer for years to buy water rights from any local farmers willing to sell them. The expansion of the city has taken over formerly agricultural land, and real estate developers have often sold agricultural water rights to the utility, as part of getting urban water services. In short, the Water Code has facilitated the growth of Santiago and its urban water supply. Nearly all of that urban supply was allocated by the Chilean government to the regional water utility many years ago, both before and after the 1981 Water Code, and so most of the utility's water rights were not acquired through the water market. Since the 1990s, however, that market has allowed a small but significant reallocation from farmers to the city.¹²

In the Maipo Basin, as throughout most of the country, water rights sales and transfers do not seem to have caused major conflicts, in large part because they have been routine but infrequent, as argued above. The great majority have taken place between farmers in shared local canal systems, where they are usually managed by private canal associations. Those associations are subject to local power relations and social inequities, which rarely benefit poorer farmers.¹³ Most of these water conflicts are about water uses or legal titles, rather than transfers per se.

Water conflicts have intensified, broadened, and deepened over the past decade or two in Chile, as summarized below. These worsening problems reflect the free-market approach to governance of the current Water Code, and its inability to coordinate different water uses, more than water rights transfers themselves.

¹⁰ For detailed discussion and references, see Bauer 1997, 1998, and 2004. For a recent summary by two water economists, see Hearne and Donoso 2014.

¹¹ Bauer 2004, pp.87-89.

¹² Manuel Prieto has shown a similar dynamic in the Atacama Desert in northern Chile. He focused on the water rights market and the role of indigenous water users, and he concluded that the largest allocations of water rights – to private water supply companies and to large mining companies – were granted by the national government rather than acquired in the market (Prieto 2015a, 2015b).

¹³ Bauer 2004, pp.92-96.

Environmental water transactions

Chile's water market has discouraged environmental water transactions, both in the Maipo Basin and nationwide, just as the Water Code has discouraged environmental flows. Neither of the two main types of water rights in Chile, consumptive or non-consumptive, has been well suited to environmental water uses. In theory, the Water Code should have allowed owners of either type of water rights to protect in-stream flows, since there is no legal obligation to use those rights (what is known in the western U.S. as the "beneficial use" doctrine, or "use it or lose it"). But there have been very few attempts to buy or dedicate water rights for environmental purposes.

The lack of legal obligation to use water rights has been very controversial in Chile. In 2005 the Water Code was reformed to require that the owners of unused non-consumptive rights must pay an annual fee to keep their rights without using them (called *patentes por el no uso*, or "fees for non-use"). The goal of this policy was to stimulate hydropower development rather than to raise government revenue, and the fees are no longer required once the rights are put to concrete use. The fees for non-use act as a strong disincentive against environmental flows, since the latter are not currently considered "uses." The fees also apply to consumptive rights, but the reform was written to effectively exempt irrigators from having to pay them.¹⁴

River governance in the free-market model

A complete analysis of the Maipo River Basin water market must include study of negotiations among owners of water rights rather than simply sales. Under the Water Code, even as reformed in 2005, the task of coordinating multiple different water users falls to private negotiations among the owners of water rights. The major human water uses in the basin include irrigated agriculture, urban supply and sanitation, industry, hydropower, mining, and recreation. All are private actors, not government enterprises. How does the water rights framework coordinate such different uses of water in a shared basin?

The short answer is: poorly. Since the government (DGA) cannot intervene, the task of coordinating multiple water users falls on private canal associations. These associations have a long history in Chile, dating back to the 1700s, organized by their members, who have always been farmers and agricultural landowners with water rights. Canal associations function to build, maintain, and operate individual canal systems, from the point of diversion from a natural river channel to the last irrigators at the tail end of the canals. The associations distribute water according to the water rights of their members, focusing almost entirely on irrigators.

At the larger basin scale, the individual canal associations that share a section of the river can join together under the umbrella of a "vigilance committee." A vigilance committee is a federation of canal associations in a given section, and as such it covers a portion of a river basin. The committee's function is to distribute water from the river to the head-gates of the different canal systems; from that point on, the canal associations distribute the water to their members.

¹⁴ Prieto and Bauer 2012; Bauer 2015.

Chile does not have river basin organizations to govern multiple water uses, and neither DGA nor other government agencies can fill this void. Some people have pointed to vigilance committees as the existing organizations that are best suited for governing multiple water uses in the current regulatory context. These committees, however, like canal associations, have always focused almost exclusively on agricultural water use and they have no authority over other water uses. Vigilance committees would have to be strengthened and broadened through legislation if they were to take on the task of governing multiple water uses.¹⁵

The first section of the Maipo River has become a partial exception to that rule. Starting in the late 1990s, increasing water demands caused growing tensions among the powerful actors and big water players described earlier. In the absence of strong regulation of water rights, these big water players had enough bargaining power to force each other to the table. The vigilance committee of the first section expanded its membership to include the Santiago water utility (Aguas Andinas) and a large electric power company (AES Gener). Although the committee has little authority over its non-agricultural members, it has been able to facilitate their coordination and compromise. For example, irrigators in canal associations have built a cooperative relationship with the city by informally lending water supplies in times of shortage. On the other hand, the first section's vigilance committee has avoided dealing with more difficult situations in which it has no leverage, such as the water and environmental conflicts generated by the large new hydropower project known as Alto Maipo.¹⁶

This governance model excludes important social and environmental interests. Only the owners of water rights can be members of the vigilance committee. Community groups, NGOs, and representatives of civil society have had very little influence or participation in Maipo Basin water management, and their critiques and opposition have grown louder and more visible in recent years. Local communities in the upper basin (the Cajón de Maipo) have faced growing problems of inadequate water supplies and infrastructure, especially affecting poor people. Environmental groups and businesses tied to tourism and outdoor recreation have tried to block new dams and river development. The current Alto Maipo hydropower project threatens to have major impacts on river flows and environment, and the project has revealed the close relationships among the large private corporations named above and with key government officials responsible for approving the project.

Another problem is that the first section's vigilance committee is concerned only with the first section of the river, which means that the river goes dry at the section's lower end. The second and third sections are less organized and still lack their own vigilance committees, and their water users are less powerful. They are at the mercy of water users upstream, who have no legal obligations to them. The problem repeats at the lower end of the second section, where the river dries up again.¹⁷

¹⁵ See Bauer 1998, 2004.

¹⁶ Borgias 2016; Borgias and Bauer 2016.

¹⁷ Borgias 2016; Borgias and Bauer 2016.

Water conflicts and governance problems in Chile

Water conflicts in Chile have grown deeper and wider in the last ten years. These conflicts have many facets: legal, political, economic, social, and environmental. Chile's institutional framework for governing water conflicts has been fragmented and ineffective, notwithstanding a partial reform of the Water Code in 2005. Political deadlock over water rights reform has been compounded by ad hoc and separate legal reforms in the energy and environmental sectors. Conflicts over property rights and regulatory governance in water, energy, and environment have become a chronic and highly visible problem in Chilean political economy. Chile's predominant response has been to create a series of specialized courts, which makes regulatory governance more fragmented at a time when natural resource and environmental problems demand a more integrated response.¹⁸

In brief, water conflicts in Chile have changed in the ten years since the Water Code was reformed: they are more entangled, entrenched, and multi-sectoral, and more nationally visible and politically high-profile. A variety of examples show continuing or worsening conflicts among multiple water uses, as demands have increased in river basins and groundwater aquifers. The situation confirms my assessment 10 to 15 years ago, that the Water Code's institutional framework was incapable of handling complicated water conflicts, because the DGA had no power and the courts had some power but little idea how to use it. This created a partial vacuum of public governance. At that time the dominant issue in Chilean water politics was the water market, not water conflicts or governance, and the general public was barely aware of the issues. The difference today is that water conflicts are deeper, wider, and more obvious, and they are more closely tied to energy and environmental conflicts.¹⁹

Reforms needed for healthy water markets

This brief case study of the water market in Chile's Maipo River Basin offers several lessons to water reformers in other parts of the world. The Maipo water market does not have a healthy balance between private and public interests. Environmental protection is notably weaker than the several powerful economic uses of water. Public participation in water governance is limited, which has led to growing resistance to the powers-that-be from social movements and non-profit NGOs. These are areas where significant reforms are needed. However, Chileans have been arguing politically over how or whether to reform the Water Code for the last 25 years, with few changes to show for the efforts.

In economic terms, water markets in the Maipo Basin and elsewhere in Chile illustrate the overriding importance of legal and institutional arrangements. The rules defined by the Water Code have shaped the incentives faced by water rights owners in deciding how or whether to use or trade their rights. Research has shown that the largest economic benefits of the Code have been

¹⁸ See Bauer 2015.

¹⁹ Ibid.

the legal security of private property rights and the incentive for private investment, whereas market reallocation has had less impact although it has been important in some situations. The proponents of the current Chilean water model have accepted the limited markets and imperfect price signals as preferable to any increased government intervention.²⁰

The critical challenge facing the Chilean water model today is how to address water conflicts, not how to improve market transactions. Water conflicts have grown wider and more intense in the past decade, as inter-sectoral relations, social equity, and environmental sustainability have posed increasing problems to existing governance capacity.²¹

²⁰ Bauer 2004.

²¹ Bauer 2015.

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