

CHAPTER 16**TRADITIONAL LEADERSHIP ON THE COMMONS: MAIN CHALLENGES FOR LEADERS OF COMMUNITY ORGANIZATIONS TO MANAGE RURAL WATER IN RÁNQUIL, CHILE**

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INTRODUCTION

Water community organizations are essential for water management in rural areas in the majority of Latin American and Caribbean countries, including Chile. However, Chile is the only country in this region where water is traded as an asset and is subjected to property rights. Despite this legal context, the behavior of local leaders and the Water Committees management system consider water as a commons. Consequently, these committees face constant obstacles caused by the duality of water management systems present in the country.

For these reasons, this chapter aims to visualize the challenges faced by these committees in the context of increasing water scarcity to guarantee the local communities' and users' access to water. The study addresses the perspectives of leaders and members of Water Committees of the district of Ranquil, a highly vulnerable territory located in South-Central Chile. Some of the main challenges identified deal with issues such as water outages, poor water quality, and the presence of forest plantations. Equally important are some obstacles related to interaction with other stakeholders of the territory, the lack of support from the state, and issues within the committees' organization and members.

Notwithstanding such challenges, leaders, locals, and water users are aware of the importance of Rural Water Committees and how their management system has successfully managed water for many decades in rural areas. Therefore, maintaining and improving this traditional system is key to guaranteeing sustainable management of water as a commons in rural areas. Consequently, all new initiatives created to tackle water scarcity in rural areas must consider the perspective of a collective approach that originates from within local organizations to avoid issues such as discoordination, unenforceability, trust issues, among others.

BACKGROUND

Chile is one of the driest regions worldwide, with a continually growing demand for water due to human activities, such as extractive industries, silviculture, agriculture, and human consumption, among others. This has left many regions of the country with a high-water deficit and caused environmental degradation and socio-environmental conflicts (Aitken et al., 2016). The multi-dimensional issues associated with water have intensified over the last few years, due to the progressive scarcity of this resource. The progressive increase of effects caused by the extractive industry in urban and rural territories has forced communities to review and redevelop the current unsustainable ways to manage the commons.

Even though we are facing water scarcity as a global issue, in the case of water in the rural areas, the problem of scarcity raises new problems and challenges for water community organizations who manage water in such areas. To better understand this issue in context, it is necessary to clarify two concepts that make this topic a unique and interesting one to visualize.

Chile has a duality of systems for managing water. There are many differences in the way water is administrated, perceived, and supplied in urban areas in contrast to rural areas. This is one of the main issues that makes water a controversial resource.

Chilean regulation and the implementation of the neoliberal economic model have enabled the privatization of water and left private sanitary companies to manage it. However, in the case of rural areas, the management of water is the responsibility of water community organizations, which have implemented their traditional system that involves concepts such as collaboration, partnership, local governance, and a different type of leadership.

This type of management system has successfully and sustainably managed water for decades in rural areas. However, the extensive misappropriation of existing water sources by different stakeholders present in rural areas and the lack of water replenishment due to global warming have caused different problems and raised many challenges for these rural water organizations.

This chapter shares a study to understand the challenges faced by these organizations and also to illustrate traditional leadership that promotes the collaborative governance of water as a commons (Ostrom, 1990) from the perspective of the water organizations in the context of the current challenges associated with the water crisis and governance process in the territories (Delgado et al., 2015).

Therefore, to guarantee access to clean water for people living in rural areas and the sustainable management of the resource, it is imperative to establish institutional, organizational, and private collaboration. This collaboration must support the existing traditional systems used by

the water organizations. Only in this way we can strengthen local governance and promote leadership on the commons.

COMMUNITY WATER ORGANIZATIONS

In rural areas of Chile water is managed by community water organizations following a principle of water as a commons. These organizations are networks that share, manage, and ensure that water can be accessed by all the members. They do not replicate the relationship of provider and consumer that prevails in the urban areas. Instead, everyone involved in the management of water as a commons has a duty as a user or part of the network. In this case, the role of the government is only to support the water organizations and ensure that they are effectively following the Hydraulic Works Department requirements, albeit by a different means and with different leadership.

Rural water associations are community organizations of functional basis, ruled by neighbor's associations, under the Decree N°58, 1997 and the Law N°19.418. Water Associations are legal and nonprofit organizations, and their members join and participate voluntarily. They can collect and administer the economic resources gathered from their respective members. These resources are used to restock materials, improve, or expand service facilities, and sign the necessary agreements and contracts to achieve the organization's goals. The associations are composed in their entirety of inhabitants and members of the community that use a common water source that is either superficial, such as springs or estuaries, or subterranean such as deep wells that supply water for hundreds of families.

According to the Hydraulic Works Department (HWD), an institution depending on the Ministry of Public Works and responsible for public policies in terms of rural potable water, there

are nearly 1900 organizations registered as water committees and cooperatives (Superintendencia de Servicios Sanitarios, 2019). However, according to the last report of the National Roundtable on Water it is estimated that there are 950 Water Associations that are not working with the Hydraulic Works Department (HWD) (Mesa Nacional del Agua, 2020). Nonetheless, based on non-official records carried out in the Bio Bio and Ñuble Regions, it can be estimated that the quantity of Water Associations outside the HWD can be similar to the ones working with them. This means that these water associations operate under more vulnerable conditions, and most of them do not have sanitary clearance since they do not have treatment systems and only distribute untreated water.

Water in Chile is regulated by two laws: The Civil Code and The Water Code of 1981. The latter is the more controversial one, due to its market-based bias that allowed the privatization of water for the first time in Chile's history. Under the new Code, water itself is considered an asset independent from the land where it is located, allowing its commercialization (Larraín, 2012; Larraín & Poo, 2010). The conflict surrounding the access to water in the country is structurally linked to the application of the management model established in the Water Code of 1981 (Figueroa, 2013).

Nowadays, the pressures derived from climate change in territories with water shortage have highlighted both the state deficiencies in terms of the administration of the resource under market logic and the organizational weakness of Water Associations. There are different public instruments to finance and deal with rural communities' water needs, including contributions from private companies within the framework of their social responsibility processes. Nonetheless, the access to water for the rural population is still a problem that requires reviewing the principles of

access to this resource—as an asset or/and as a right—and the institutional reformulations that guarantee sustainable management of common-pool resources (Ostrom & Hess, 2010).

In this context, the need to strengthen the HWD staff and professionalize the Water Associations led to the creation of the Rural Sanitation Services Law in 2017 (Law 20.998). However, the regulation for the application of this law is very recent (October 2020), so the process to strengthen water associations has not started yet.

In Chile, as in many other places in the world, rural water is a resource in dispute, from the perspective of values, and this value conflict is caused by incompatible belief systems. On one side, there is the action of the state and its administration of water as an asset; on the other side is the relationship and use of water by the communities and families as a commons. This translates into disorganized and unfocused systems of institutional governance (Mesa Nacional del Agua, 2020), which were designed from the perspective that sees communities only as consumers of a service. Despite these opposing proposals, both strategies have proven insufficient to guarantee fair management of water. This is one of the main issues for the constitutional debate in Chile in 2021 and 2022 (Moraga, 2019).

All these actions take place in Chile at the same time as an ongoing constitutional deliberative process, where the citizens' concerns are particularly focused on environmental matters. All these concerns were expressed starting with the “social outburst” of October 2019 (Reyes-Mendy et al., 2020). In this manner, the water crisis is a key topic in public debates, in institutional administration, and especially in community administration. In this context, local leaders must deal, not only with the management of their community water services but also incorporate new perspectives to maintain informed and efficient leaders within their communities.

For this reason, they require new ways to understand social and legal processes, dedicate more time and effort to study, and have updated information.

Consequently, our study aims to provide a better understanding of how the current national context in terms of water availability, political policies, regulations, the involvement of the state or other private or institutional stakeholders, among others, are affecting the role of Water Associations and we carried out a specific study to achieve this goal.

DESCRIPTION OF OUR STUDY

LOCATION BACKGROUND AND CURRENT SITUATION

Before we begin describing this study, it is necessary to situate and incorporate some geographical information about the location where our study takes place. Our study is based on the district of Ranquil located in the west of part of the Ñuble Region in South-Central Chile. The main water supply of the Ñuble Region is the Itata River; this area is also called the Itata Valley.

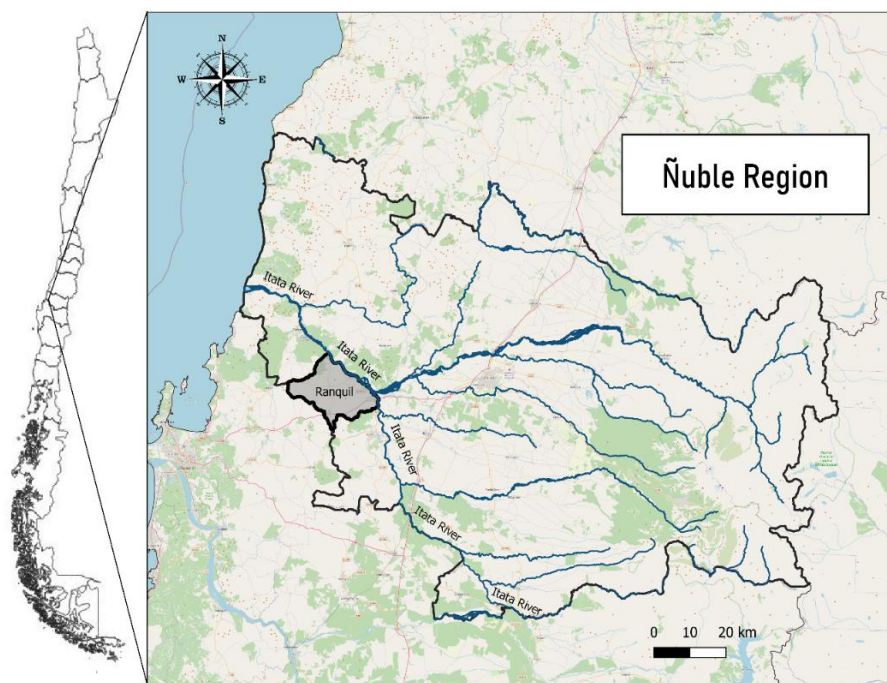


Figure 1: The following map illustrates the areas mentioned above in the Ñuble Region

In the Ñuble Region, there are around 689 Water Committees, which supply water to 146,929 people (INE, 2017). Rural water is essential in this area and for the communities in the study not only for supplying water to people but also for their livelihood since small-scale farming is the productive base of rural family agriculture.

However, in this region, the issue of water scarcity is worsening, especially in the most rural areas. Year after year, the lack of rain and scarce replenishment of water tanks make water availability and accessibility difficult. Recently, the region's water deficit has increased to 50% (Baeza, 2017). Considering that this region has the largest percentage of the rural population in Chile, 30.6% (INE, 2017), the situation is critical. Thus, the committees and their leadership are even more important in this context of crisis.

The Itata Valley as many other valleys in Chile is known for its viticulture, which was one of the main economic activities in the area for many decades. Many economic activities are surrounding the Itata River, such as agriculture, livestock, hunting, viticulture, and forestry. Nonetheless, since 2006, the forest activity acquired more prominence due to the installation of the Industrial Plant of Cellulose Nueva Aldea in the area and brought new effects in the territory.

One of them is the rapid expansion of forest plantations in the last decades. For instance, in 1994, 19% of the territory was covered by farms and 30,46% by forest plantations. However, by the year 2015, 52,52% of the territory was covered by forest plantations and only 9% by farming activities (Agencia de Sustentabilidad y Cambio Climatico, 2018). This has not only caused important changes in the land use of the district of Ránquil but also has affected the development

of other productive activities in the area and explains the power dynamics from different stakeholders in the territory. Other effects brought by the Cellulose Plant are conflicts with the community due to air pollution caused by the plant's fumes, bad smell, and bad water quality.

All of these aspects condition and affect local governance, especially considering the number of stakeholders present in the territory and the different water uses. For this reason, the social processes related to water involve necessarily the interaction among diverse stakeholders in the territory and can lead to conflicts for their use (Larraín & Poo, 2010; Ostrom & Hess, 2010). Moreover, to guarantee the sustainability of water resources, particularly to guarantee its access for human consumption, there is a need for collaboration, articulation, and leadership.

Without disregarding the interactions between the stakeholders and the predominant forces in the decision-making processes and access to water, it can be observed that community work is becoming more important than ever. In other words, water scarcity has not only caused a lack of water, but also brought new challenges and demands for the inhabitants, community organizations, and above all, for their leaders.

METHODOLOGY AND DATA COLLECTION

A previous study carried out in a forest micro basin in the district of Ránquil, with the participation of its Water Committee, evidenced aspects related to local knowledge about water from the perspective of local communities (Vargas, Carrasco, & Vargas, 2019). The challenges for the governance and leadership resulting from this study set a start point for the research included in this chapter.

To understand the challenges identified in previous studies and to visualize the perspective of local leaders and inhabitants, we used different sources, such as interviews, participant observation, and participatory online research to collect the information.

Firstly, the sample selection was built considering, as the main criterion, that they were leaders of a committee and members of the Communal Union of Ránquil. This is a community organization that groups all the Water Committees of the district. The interviews with secretaries, presidents, treasurers, and users of the committee were carried out in February 2019.

Secondly, participant observation was conducted during the six sessions of the Voluntary Agreement for Watershed Management (hereinafter referred to as AVGC) carried out in 2018, in which the Water Committee's leaders and Communal Union participated along with representatives of the regional government, forest companies, and the cellulose plant. This agreement was signed in Ránquil in January 2018 and coordinated by the Sustainability Agency for Climate Change that depends on the Economic Development Agency (CORFO in Spanish). Its content was created through a participatory process carried out in 2017. This process included the participation of representatives from public organizations, local universities, and the municipality, including the participation of Water Committees' leaders of the district. The main goal of this agreement is to “build and implement a local governance process to advance collectively towards the sustainable development that emphasizes the integrated management of the water resources in Ránquil” (Agencia de Sustentabilidad y Cambio Climatico, 2018). From these events, it was possible to identify the characteristics and the challenges of the leaders facing the requirements caused by the water crisis and the difficulties for fair governance of water in the territory.

Thirdly, the process of participatory research online carried out through the project SIMOL (Local Monitoring System) enabled us to work collectively with a group of twenty people,

including leaders, students, teachers, members of Water Committees. This online research covered some questions about the characteristics of water leadership, their attributes, and challenges.

The data collected helped to organize the analysis of the challenges faced by the water leaders. Through the systematization and analysis of the three sources mentioned above, it was possible to gather their needs, learnings, proposals, and questions to advance towards a local water governance model that emphasizes the community attributes and allow them to act collaboratively. Management can help to face challenges such as water scarcity and promote new forms of governance of the commons.

FINDINGS IN RÁNQUIL

CRITICAL ISSUES CALLING FOR LEADERSHIP

1. OUTAGES

After the systematization of the data collected from interviews, we identified that the most common everyday issue in rural areas of Ránquil is the repetitive outages of the water supply. During the summer, the situation is critical since the number of outages increases and the restoration time can vary from a couple of hours to a week in the most affected areas. In some cases, the outages are planned and programmed, and they only last a few days or a couple of hours in the best-case scenario. However, in general, most water outages are unexpected and are a permanent concern for the users, especially during summertime. These outages affect the users' daily life and the irrigation of vegetable gardens and plants. Nonetheless, for the leaders of Water Associations, the outages cause them a lot of pressure since they receive calls from neighbors when this happens, especially in the summertime.

2. WATER QUALITY

In addition to the outages, some leaders of Water Committees that are not part of the Hydraulic Works Department state that in many cases the water quality is not good, but they do not always have the resources to drink water from other sources, such as bottled water. A fraction of the participants described that sometimes the water is brown due to the presence of sediment in the water. In these cases, leaders must be especially diligent in organizing the community for cleaning or repairing activities.

3. THE EFFECTS OF FOREST PLANTATIONS

On the other hand, from the perspective of leaders, most of them agree with considering forest plantations as primarily responsible for the water scarcity in the territory. Some users state that the high amount of water consumption of forest plantations and the cellulose plant is evident in the river's water level. In addition to water scarcity, leaders mention that there are some other effects caused by the plantations, such as drought and damage to the fauna due to the use of pesticides. Only one interviewee (n=17) has a positive impression of forest plantations. Besides the effects on the amount of water consumption, the interviewees mention that there is no protection of watercourses since the plantations are everywhere. They also mention the change of land use from farms to forest plantations. This aspect was repeatedly mentioned in the AVGC sessions where participatory observation was carried out. In said sessions, an agreement from forest companies and public organizations was achieved to restore special conservation sites for water sources. Nonetheless, this is a medium and long-term agreement that requires great coordination efforts that have not been fully developed in the territory.

4. ARTICULATION WITH OTHER STAKEHOLDERS

FOREST COMPANY

One of the findings from the interviews and observant participation was the relationship of local communities with the forest company. Locals mentioned that the company did not fulfill prior agreements with the communities and local organizations, which implicates permanent tensions and negotiations. This assessment from the leaders regarding unfulfilled agreements by the main industry in the district, also reveals the presence of a sense of community or commons that appeal to obtaining answers to dignify the inhabitants as a union rather than compensation for particular individuals.

MUNICIPALITY

Regarding the relationship with the municipality, many users state that they are unhappy with the institution. They mentioned that the institution only acts when there is a critical situation causing a feeling of abandonment and inattentiveness regarding the water issue. Nonetheless, in most cases, leaders are aware of projects or plans to face water issues, including governance processes such as AVGC and SIMOL. Thus, leaders recognize institutions and processes, but they also understand the importance of strengthening the community as a fundamental aspect of water sustainability.

HYDRAULIC WORKS DEPARTMENT - STATE

In terms of the relationship with the state representatives and institutions on which the leaders rely for funding and support, they mention that their main obstacle to fulfill their role comes from the slow process of the state. Some urgent projects will enable the catchment, distribution, and treatment of water, but the approval and execution take years. Furthermore, they mention a lack of funding and tools to support committees that are not self-sustainable by the contributions of their members and who cannot pay higher fees due to their socioeconomic status. Lastly, another

concern that affects the leaders socially and psychologically is the lack of answers from the state in critical situations of scarcity, in which new studies and investment are urgent to update their infrastructure.

OTHER FINDINGS

EVERYDAY PRACTICES TO DEAL WITH SCARCITY

In terms of the everyday use of water among the members of the committee, there are some practices carried out by them to save and reuse wastewater from laundry and shower for irrigation purposes, such as plants and small vegetable gardens. Also, leaders identify some changes in the people's everyday practices that show more awareness of the scarcity. For example, their showers are brief, and they avoid leaving the water running when washing their hands, teeth, or the dishes. Although these practices are small changes, at the same time they are a sign of a decline in life quality making rural life more difficult.

Last but not least, there were some other aspects identified by the participants including the need to increase the supply capacity, technical support for the Water Committee operator and the community, raising funds, and building trust among users and leaders, and involving people who are committed to water management.

THE ROLE OF WATER COMMITTEES

The operation of different Water Committees in the district is varied. On one hand, some Water Associations work very efficiently in every aspect (coordination, communication, execution of works, maintenance, meeting attendance, etc.). On the other hand, there are some committees that do not work as efficiently and some conflicts can be found between the leaders and members that affect greatly communication and community coordination.

Most of the users and leaders recognize the importance of Water Committees for the users since they know that without participation, they would not have access to drinking water. Nevertheless, they mention some reasons why some Water Committees work differently than others. The main reasons are the lack of commitment from Water Committees' members and users to attend meetings and pay the monthly fees, lack of awareness from users who waste the water, and the need for a committed board of directors. This aspect was repeatedly mentioned in the AVGC sessions. Leaders insisted on the importance of design and implement dissemination and training activities that could help them to motivate the informed participation of the population.

EXPERIENCES OF WATER AS A COMMONS FROM THE LEADERS AND THE GOVERNANCE PROCESS

One of the main findings of this study shows that despite the regulation of the state and institutions, the community vision and sense of water as a common and a basic universal right prevails in them. In this interstice, leaders must face the challenges inside and outside their communities through constant interaction with public and private agents for the proper operation of local water systems. From the interviews, we could collect and understand the issues caused by the water deficit in the district of Ránquil and the disposition of their leaders for the defense of water as a commons.

The leaders of Water Committees that carry out their duties from the perspective of collaborative leadership agree on three main aspects to understand their roles:

- a) To maintain this form of leadership, leaders must have a sense of responsibility towards their neighbors and build trust with the users.

- b) They must maintain a form of communication that allows them to act on behalf of the benefits for the community.
- c) The leaders must understand that their leadership is not more important than the participation of the users or members of the committees.

From the perspective of a collaborative leadership approach of water as a common, leaders have an important role in the management of water. However, it is equally important that the users and members of the committees are aware of the use of water, besides attending meetings and paying the fees. Therefore, Water Committees are an example of collaborative leadership that is not comprehended from the individuality but the collective and their common interests and problems.

The concerns mentioned by the leaders, users, and members of Water Committees in Ránquil constitute an important source for the challenges in the redesign of water governance in Chile. Initiatives such as AVGC and SIMOL hope to become a space to support this new governance model, establish serious institutional commitments, and involve more participation from the user's organizations and committees. The water crisis in the last few decades has evidenced that one of the main weaknesses in the water access systems in rural areas is the coordination between institutional representatives and the organizations' leaders, especially the rural users that are economic and socially vulnerable.

CONCLUSIONS AND IMPLICATIONS

LESSONS AND CHALLENGES FOR THE LEADERSHIPS OF WATER AS A COMMONS

The information obtained through this study illustrates the premise that rural water in Chile is a common-pool resource in dispute but conditioned by different systems of institutional

governance, and by the effects of the change of land use that replaced traditional productive activities, such as the production of monoculture plantations at a large scale in their territories. From a social standpoint, community water management seems to be the main alternative to face the challenges of the climate crisis and guarantee the availability of this resource for the people who depend on it for personal, domestic, or farming use. Certainly, this entails changes and adjustments in the manner of organization in the management of Water Committees, and therefore new competencies and abilities for their leaders.

Consequently, all new initiatives created to tackle water scarcity in rural areas must consider the perspective of a collective approach that originates from within local organizations to avoid issues such as discoordination, unenforceability, trust issues, among others. Even though there are some Water Committees that are not working as efficiently as others, their management system has worked for many decades and all efforts should aim to improve their traditional ways and support their important roles in the conservation and sustainable management of water.

One of the main implications from the findings was the need to visualize the challenges faced by Water Committees' leaders to fulfill their roles. Only then we can find ways to facilitate their duties and at the same time promote the creation of new leadership based on the commons in rural territories. For this reason, we included the following infographic summarizing the main proposals from leaders of the territory during the development of the project SIMOL.

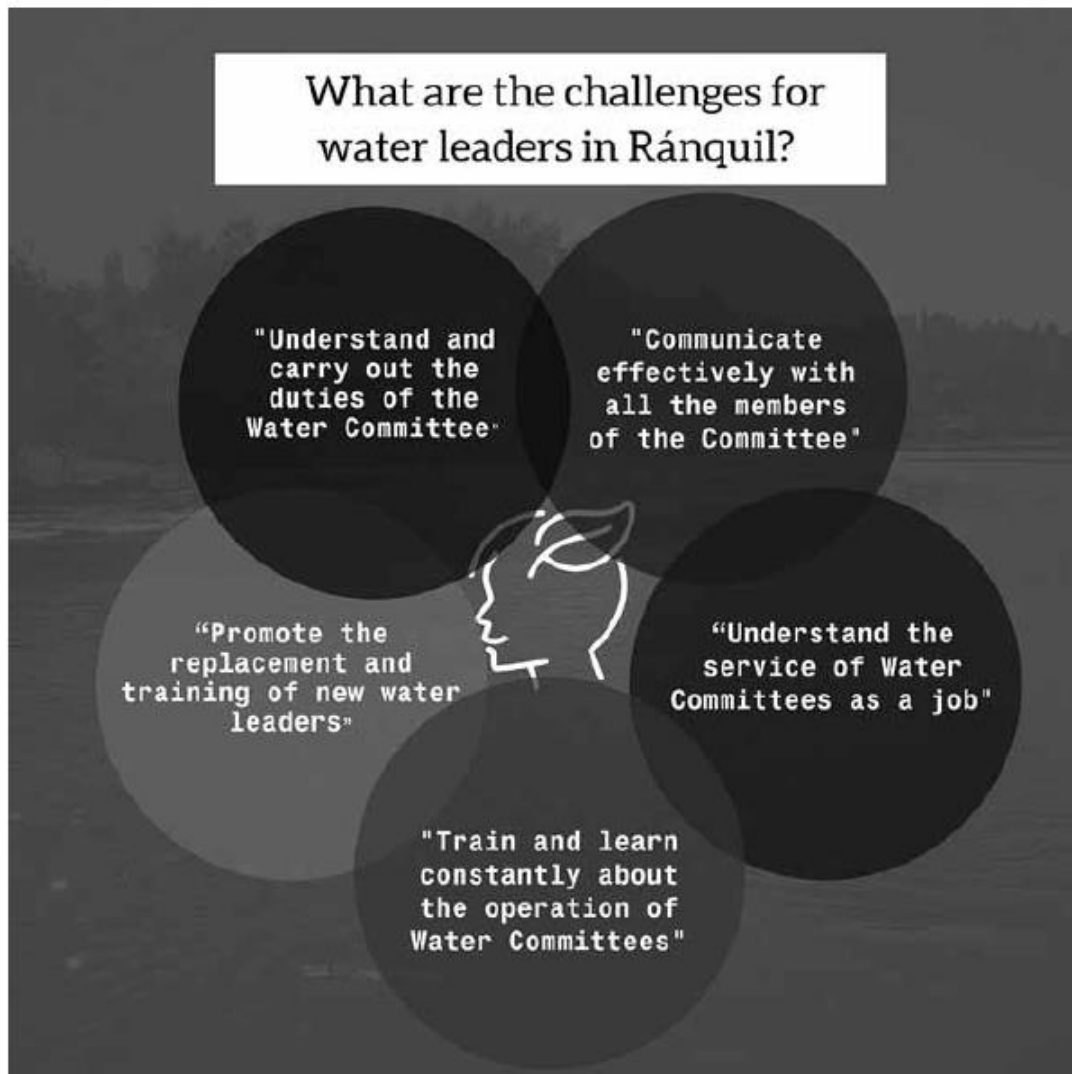


Figure 2: What Are the Challenges for Water Leaders in Ránquil? (SIMOL, 2020)

These principles enable the analysis of institutions from within and provide ideas and proposals to improve them and emphasizes the need to be respected by all stakeholders in the territory. For this reason, strengthening the Water Committees is essential, especially counting with leaders that aid the empowerment, counsel, and training of committed users who can improve the management tools and water governance in the territory. This is the only way to move forward towards the construction of robust models capable to face the governance challenges.

Based on the information obtained from the interviews, it can be confirmed that Water Committees are capable to successfully manage their water resources. However, there are some issues related to the effectiveness of the management that can affect the work inside the committees as well as the participation in processes of articulation and governance with other stakeholders of the watershed. The public administration has scarce resources and in most cases is managed in a disorganized manner and without the proper technical consultation or local pertinence. This situation worsens the condition of the vulnerability of the rural population subjected to this type of politics.

The study analyzed shows that even though in Chile water is considered as an asset and is commercialized, rural community organizations have preserved a collaborative way to manage water as a common. The legacy of values and ecopolitics that the Water Committees pass on became more relevant when we analyze it in the context of a dispute between interests, productive scales, and sociocultural models of water usage, as exemplified in the study with the forest industry. The results of the analysis conducted to illustrate the complex and varied nature of the challenges to face governance in this type of setting. Also, they encourage paying more attention to the local and social adaptation processes the global water crisis faces.

Our proposal to understand the leaderships of water as collaborative leadership focused on the collective and common interests can be adjusted to adaptation processes for the climate crisis. Nonetheless, these processes do not only include the communities, local users, or water committees, but also institutions and policies that must be updated and coordinated to benefit efficient, pertinent, and timely management. These processes also involve the sciences and academia in general to guarantee a new political science interface in which the territories and local

knowledge and practices have an important place. In this way, it is possible to imagine new ways of governance.

From our point of view, these leaders can be considered as evidence of our collective sense and relationship with water that never faded despite the efforts to consider water as a market asset that was imposed by the neoliberal model installed in Chile from the democratic backsliding of 1973. The collaborative leaderships of water as a common are the start point and patrimony to reevaluate the sustainability of water from its multiple implications for the society, ecology, and above all, the territories.

FINAL THOUGHTS

The pandemic of 2020 has evidenced many aspects regarded in this chapter. The multidimensional vulnerability of the rural population has exacerbated, and the water crisis has become a priority in public and territorial agendas. Based on the importance of handwashing as the main preventive action against the COVID-19 virus, it is essential to provide access to water for all people, particularly people who live in rural areas, where access to health care facilities is already limited. From this point of view, the pandemic has pressured a variety of institutions to prioritize, even more, the importance of access to water for everybody.

Additionally, to existent inequalities, the communication gap between the urban and rural worlds has become evident. The lack of access to Internet providers or bad mobile network coverage has affected the participation of people living in rural areas. The pandemic has visualized even more the uncertainty of a potable water supply in rural areas and the great inequalities between the population living in rural areas with the ones in the cities.

Water as a commons and public resource is a transversal civic claim in Chile nowadays. From the social outburst of October 2019, a social and political process has started in Chile to reevaluate the ways the natural resources are managed in the country. In this complex and challenging scenario, collaborative leadership of water as a common are especially valued. This implies that changes in the public institutions and administration in the territories must be reformulated. This is what we hope to happen in Chile through the constitutional process that begins in 2021.

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REFERENCES

- Agencia de Sustentabilidad y Cambio Climatico. (2018). *Acuerdo Voluntario de Gestión de Cuencas Ranquil*. Recuperado de <https://www.ascc.cl/resources/uploads/documentos/archivos/668/convenio.pdf>
- Aitken, D., Rivera, D., Godoy-Faundez, A., & Holzapfel, E. (2016). Water Scarcity and the Impact of the Mining and Agricultural Sectors in Chile. *Sustainability*, 8(2). doi:10.3390/su8020128
- Baeza, E. (2017). *Situación hídrica de la provincia de Ñuble, Región del Biobío*. Recuperado de https://obtienearchivo.bcn.cl/obtienearchivo?id=repositorio/10221/24258/2/Informe_Agua_Regi%C3%B3n_Atacama_Final.pdf
- Delgado, L. E., Torres-Gomez, M., Tironi-Silva, A., & Marin, V. H. (2015). Local adaptation strategy to climate change for equitable water access in Chilean rural zones. *America Latina Hoy-Revista De Ciencias Sociales*, 69, 113-137. doi:10.14201/alh201569113137
- Figueroa, D. (2013). *Legislation on use of water in agriculture. Chile*. Recuperado de Washington DC: <https://hdl.loc.gov/loc.law/lglrd.2013417719>
- Hardin, G. (1968). The Tragedy of the Commons. *Science*, 162, 1243-1248.
- INE. (2017). *Censo de Población y Vivienda*. Santiago
- Larraín, S. (2012). Human Rights and Market Rules in Chile's Water Conflicts: A Call for Structural Changes in Water Policy. *Environmental Justice*, 5(2), 82-88. doi:10.1089/env.2011.0020

- Larraín, S., & Poo, P. (2010). *Conflictos por el Agua en Chile. Entre los Derechos Humanos y las Reglas del Mercado*. Santiago: Chile Sustentable.
- Mesa Nacional del Agua. (2020). *Primer Informe de la Mesa Nacional del Agua*. Recuperado de https://www.mop.cl/Prensa/Documents/Mesa_Nacional_del_Agua_2020_Primer_Informe_Enero.pdf
- Moraga, P. (2019). *La protección del medio ambiente: reflexiones para una reforma constitucional*: Editorial Jurídica de Chile.
- Ostrom, E. (1990). *Governing the commons: the evolution of institutions for collective action*. Cambridge: Cambridge University Press.
- Ostrom, E., & Hess, C. (2010). *Private and common property rights*. Cheltenham: Edward Elgar Publishing Ltd.
- Reyes-Mendy, F., Valenzuela Calderón, M., & Chaura Vega, C. (2020). *¿Cómo pensar los desafíos ambientales de cara a una nueva Constitución? : preocupaciones ambientales en tiempos de cambio constitucional*. Recuperado de <https://doi.org/10.7764/datasetUC/CCG-UC.11534/29406>
- Schuster, J. P. (2017). *50 AÑOS DE PROGRAMA DE AGUA POTABLE RURAL EN CHILE*. Un análisis institucional y normativo en el marco de la reforma del sector. Tesis presentada a la Facultad de Arquitectura, Diseño y Estudios Urbanos de la Pontificia Universidad Católica de Chile Recuperado de <https://estudiosurbanos.uc.cl/wp-content/uploads/2017/01/TESIS-JPSO.pdf>

SIMOL. (2020, November 1). Desafíos para la gestión local del agua. Retrieved December 10, 2020, from <http://sistemademonitoreolocal.cl>

Superintendencia de Servicios Sanitarios. (2019). *Informe de Coberturas del Sector Sanitario* 2018.

Vargas, V., Carrasco, N., & Vargas, C. (2019). Local Participation in Forest Watershed Management: Design and Analysis of Experiences in Water Supply Micro-Basins with Forest Plantations in South Central Chile. *Forests*, 10(7). doi:10.3390/f10070580