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# Chilean institutional policies and multi-level agents: Challenges from the COVID-19 pandemic and carbon footprint

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**Introduction:** As a result of the increasing number of multilateral agreements that Chile has signed, different sectors of consumption have become sources of emissions. In this context attempts to implement guidelines to address this issue have been made. Nevertheless, international policies such as sustainable development goals (SDG) 11–12 often generate dissonance in national and local administrations and have been approached by different instruments to reduce the effects of emissions, mostly focused on the private industrial sector.

**Methods:** This article focuses on four of the most polluted cities in south-central Chile (Coronel, Temuco, Valdivia, and Osorno). Key agents (ministries, regional government, municipalities, and civil society) from three levels of policy development were selected at three scales (national, regional, and local) and interviewed considering three thematic axes: knowledge of carbon footprint areas (housing, heating, food, mobility, and energy), institutional governance, and adaptive changes due to COVID-19.

**Results:** The results show that in Chile, there is a multiscale climate governance led by the Ministry of the Environment (national level), followed by the regional and local levels. Citizens are then left with few capacities, which is negatively viewed. In relation to the carbon footprint and COVID-19, it can be observed that the topic of energy was more addressed at the national and regional levels. Food and energy, followed by heating and then mobility were addressed at the communal level and in civil society.

**Discussion:** Decision-making strategies and policies were discussed in this paper.

## KEYWORDS

pandemics, carbon footprint, political institutions, climate change, government policies, Chile

## Introduction

Sustainable development goal (SDG) 11, “sustainable cities and communities,” indicates in its goal 11b that “by 2020, the number of cities and human settlements will substantially increase adopting and implementing integrated policies and plans toward inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030,

holistic disaster risk management at all levels” (United Nations, 2022), urging governments to take measures to mitigate greenhouse gases.

In that context, the COVID-19 pandemic has been an external stressor that completely changed our lifestyles. Nevertheless, it was particularly relevant for testing hypotheses concerning greenhouse gas emissions that have been affecting air quality in different regions of the planet for decades (Dantas et al., 2020; Mahato et al., 2020; Muhammad et al., 2020; Rugani and Caro, 2020). In this matter, carbon footprint has been one of the most widespread measures to reduce emissions, mitigate the effects of climate change, and reduce ozone depletion. However, its measurement and calculation are still under development (Pandey et al., 2011). Each country has developed different action frameworks to measure carbon footprint according to its own particularities and associated with the area they wish to reduce, in line with its own social, economic, and political development objectives (Rojas et al., 2021b).

This catastrophe provided a unique opportunity to study the effect of carbon footprint in long periods of nationwide confinements in Chile (Rojas et al., 2022), just as public policies are working to solve problems associated with the mitigation of greenhouse gases. During 2020–2021, a survey was conducted to identify public policy opportunities at different scales resulting in 21 measures (Rojas et al., 2021b). It also identified changes in consumption patterns in Chilean households in four relevant areas (energy, food, mobility, and heating) before and during the pandemic. For example, “thermal insulation of houses increased by 30%, motorized mobility to go to schools was reduced, and food purchases by delivery increased” (Rojas et al., 2021a).

The integration of public policies on climate change has been increasing in Chile, for example, the 1998 Climate Change Strategy and then the implementation of the Ministry of Environment in 2010 [Arriagada et al., 2018; Ministerio del Medio Ambiente (MMA), 2021a]. In 2016, the second Environmental Performance Assessment Report for Chile was published (OCDE, 2017). It highlights the progress made in the last decade in terms of implementing an environmental institutional framework, sustained economic growth, and infrastructure. Despite this advancement, the report accounts for inadequacies in income inequality, energy consumption, materials, greenhouse gas emissions, waste generation, pollution in urban and industrial areas, and water scarcity. In this regard, the same report specifies the need for an environmental policy that addresses the articulation of different sectors to mitigate the effects of climate change.

In this context, Chile presented an updated version of the Nationally Determined Contribution (NDC) in 2020. It became the first country in Latin America to comply with the international commitments assumed by the State of Chile in this matter. This process culminates in 2022 with the Long-Term Climate Strategy (LTCS) 2030–2050 and the enactment of the Climate Change Framework Law (Figure 1) in the same year. The purpose of the latter is to face the challenges posed by climate change. To do this, it is required to move toward a development low in greenhouse gas emissions and other climate-forcing factors, until reaching and maintaining carbon neutrality by 2050, reducing vulnerability, increasing resilience, and meeting a demanding 2030 Agenda in its 17 principles, especially those based on cited SDG 11, “Responsible Production and Consumption” (SDG 12) and “Climate Action” (SDG 13) (United Nations Environment Programme, 2020).

The fulfillment of these SDGs generates new challenges in terms of the articulation of actors at multilevel when expressed territorially from different approaches (Gibson et al., 2000) and in multiplicity (Cash et al., 2006). Nonetheless, their existence does not imply that there are significant interactions between levels, institutions, and/or scales. Moreover, such interactions have not been studied in the framework of environmental governance (Gibson et al., 2000; Cash et al., 2006; Landauer et al., 2019).

In Chile, although CC governance studies have been conducted (Arriagada et al., 2018), they have focused on proposing polycentric approaches to public policies, rather than evaluating interactions between territorial levels.

In this regard, the objective of this article is to analyze the functioning of climate change governance in Chile among the different territorial levels. It is important to note that if countries want to move toward achieving the goals of SDG 11, they must study how global recommendations influence national commitments and measures. In turn, these permeate into cities or local levels and vice versa, especially due to the influence of lifestyles and customs of the citizens.

To this end, information was collected from interviews with relevant actors during the COVID-19 confinement period with the purpose of collaborating in the establishment of recommendations for local and global sustainability public policies regarding climate change. These policies are currently influenced by foreign impositions such as the international treaties signed by Chile (Huneus, 2020).

## Study case

A total of four intermediate cities were selected for this study. They are all vulnerable places in terms of respiratory diseases caused by socioenvironmental conditions when facing a pandemic and a global financial crisis. All these cities are in the south-central regions of Chile: Coronel (Biobío), Temuco (La Araucanía), Valdivia (Los Ríos), and Osorno (Los Lagos) (see Figure 2). Climatically, these cities are in the central (Coronel) and southern (Temuco, Valdivia, and Osorno) macro-regions.

All of them have long and cold winters, as opposed to short and hot summers, as well as low temperatures and high rainfall throughout the year (Sarricolea et al., 2017).

These cities are characterized by high levels of air pollution throughout the year. This phenomenon has led to permanent critical episodes of air saturation (Huneus, 2020). In addition, these cities are considered financially vulnerable and energy poor. In other words, an important part of their population has difficulties accessing quality energy sources, either because of their income and energy costs or the level of residential energy efficiency (Urquiza et al., 2019). This situation has compelled locals to prefer firewood as fuel to cook and heat their houses. By using this form of heating, air pollution levels increase as respiratory diseases, such as COVID-19, worsen in at-risk populations (pregnant women, older adults, chronically ill, children, and infants) (Travaglio et al., 2020).

To analyze territorial levels, different scales that are linked to these cities have been considered, including the national, regional, communal, and finally, the civil society that receives the public policies carried out by the government (Table 1).

## Methodology

A qualitative approach was considered for this article. This type of approach allows “understanding the phenomena deeply, exploring them from the perspective of the participants in a natural environment, and in relation to the context” (Hernández Sampieri et al., 2010, p. 364). In this matter, the main methods applied in this study considered the review of legal documentation and semi-structured interviews.

As an analysis approach, this project considered the four dimensions of carbon footprint (Muñiz et al., 2016; Dubois et al., 2019; Muñiz and Rojas, 2019) corresponding to (i) energy, (ii) heating, (iii) mobility, and (iv) food purchase. In turn, these dimensions are considered thematic axes, the carbon footprint itself, the changes caused by the COVID-19 pandemic, and the interference of the different institutional instruments in this context. The research development considered three sequential stages that correspond to as follows: Stage 1—review of regulations, Stage 2—conducting interviews, and Stage 3—analysis of regulations and interviews.

### Stage 1: Review of regulations

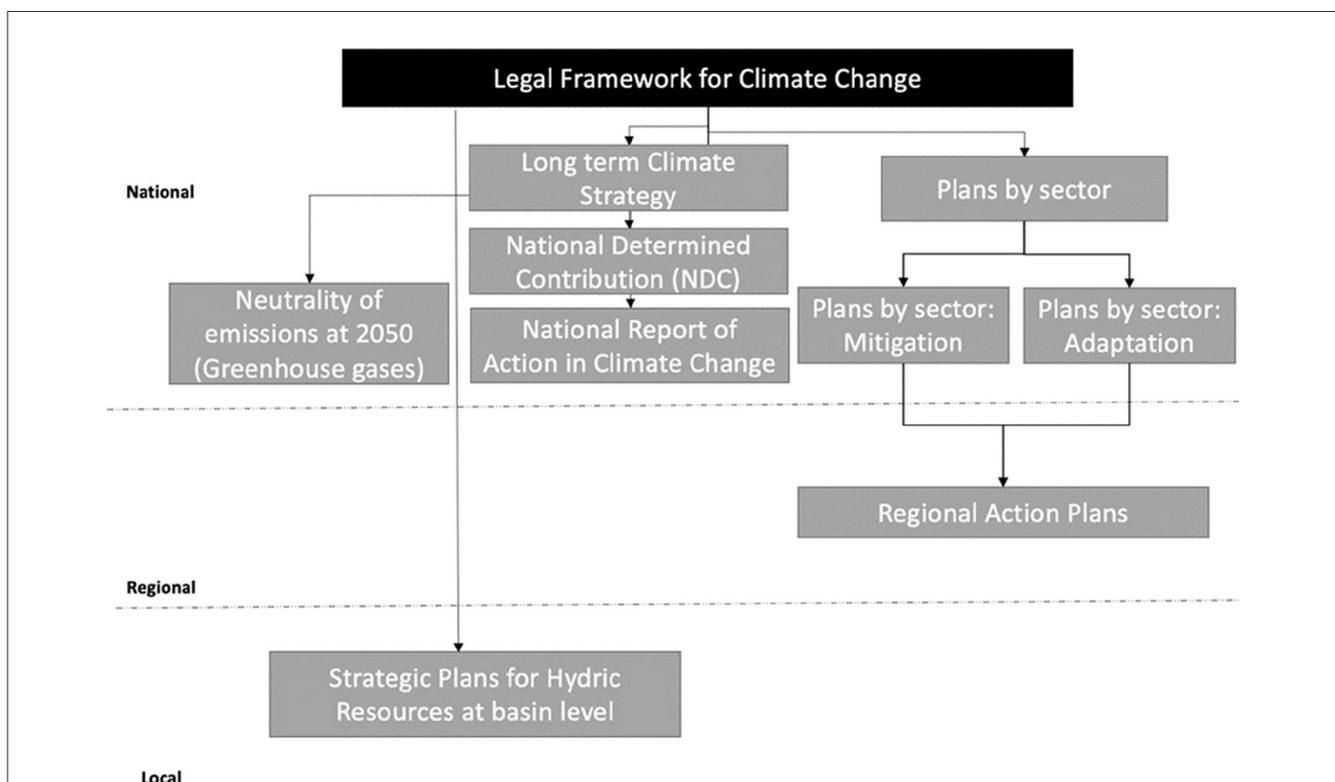
First, to understand the current institutional framework for climate change in Chile, a review of Chilean regulations related to

Climate Change Institutionalism was carried out. To this end, the search strategy considered the review of the Library of the National Congress webpage (<https://www.bcn.cl/portal/>) and the website of the Ministry of the Environment (<https://mma.gob.cl/>).

### Stage 2: Conducting interviews

The application of a semi-structured interview adjusted to the different types of interviewees allowed us “to motivate the interlocutor, clarify terms, identify ambiguities, and reduce formalisms” (Díaz Bravo et al., 2013, p. 163). In this way, it has been possible to reach a joint construction of meanings regarding key issues of the project (Janesick, 1998 in Hernández Sampieri et al., 2010).

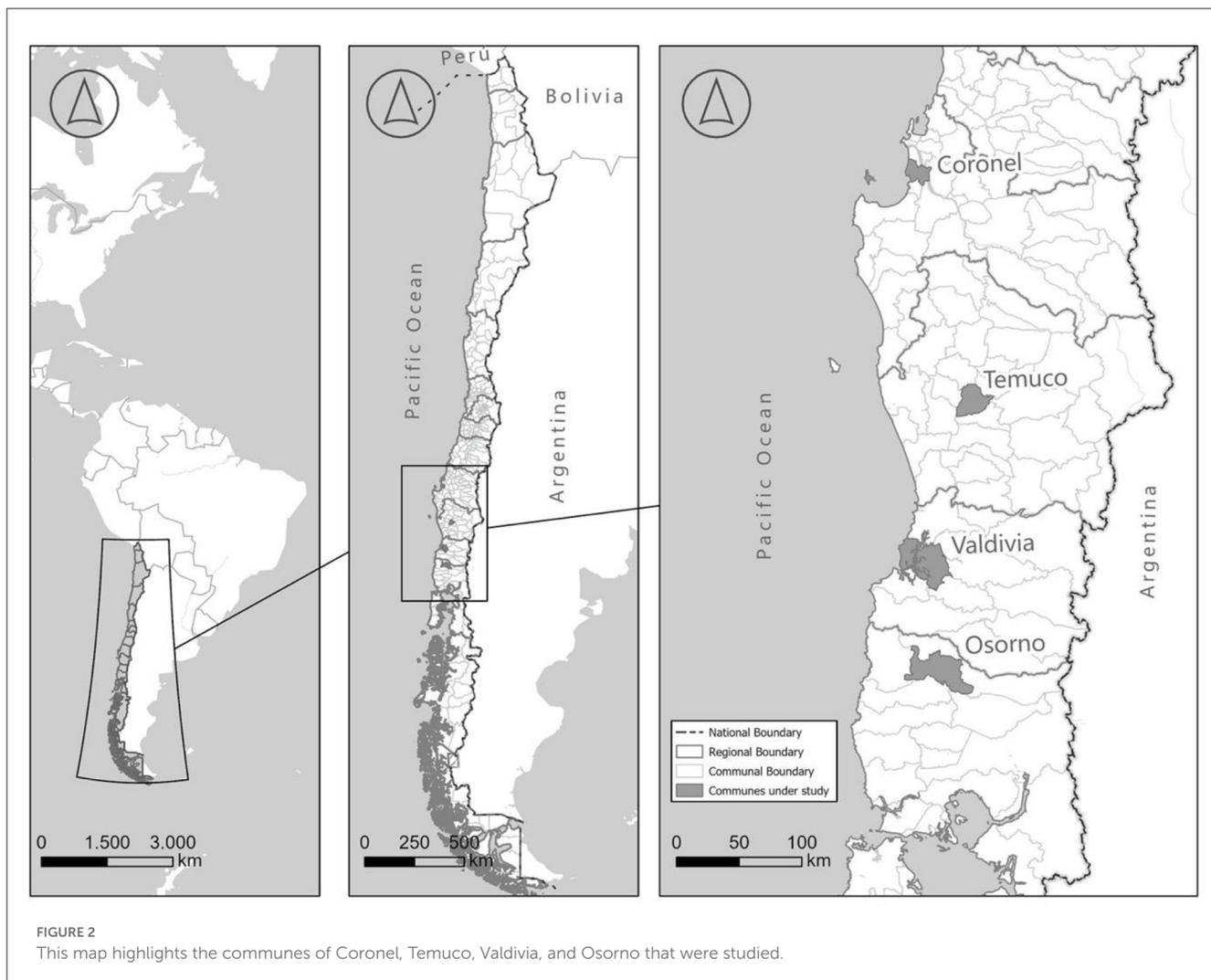
An interview guideline structured in six parts was designed to cover the previously mentioned dimensions and themes of analysis as follows: (1) general background (contextualization); (2) COVID-19 context—changes that have occurred in the city; (3) COVID-19 context—strategies and learning in the work environment; (4) knowledge of carbon footprint; (5) institutionality, regulations, and instruments of environmental management, and territorial planning and public instruments of carbon footprint in cities; and (6) closing. The design considered the implementation of informed consent and 60-min interviews *via* Zoom.



Source: Adapted from MMA (2022) and Centro Políticas UC (2021)

FIGURE 1

A diagram showing the linkage between various instruments and public policies related to climate change established by the Chilean Ministry of Environment. Source: Adapted from Centro UC de Políticas Públicas (2021), Ministerio del Medio Ambiente (MMA) (2021a).



**TABLE 1** Territorial entities considered in the case study.

Territorial scale	Entity			
1. National	Chile			
2. Regional	Biobío	La Araucanía	Los Ríos	Los Lagos
3. Communal	Coronel	Temuco	Valdivia	Osorno
4. Civil society	Citizen			

Source: Prepared by the authors.

A heterogeneous sample of interviewees was selected. They were evenly distributed among public actors at national, regional, municipal, and local levels including 30 people in total (Table 2). Of the total number of interviews conducted, 42% were represented by women and 58% by men. The interviewees' age ranged from 33 to 71 years, with an average of 49.5 years.

The national scale involved representatives of ministries, sustainability agencies, and undersecretaries including seven actors in total. The regional scale was represented by Regional Climate Change Committees, including representatives of the Regional

Ministerial Secretariat (SEREMI) of Environment, Transportation, Science, Housing, and Urbanism, reaching eight interviewees. Finally, the communal/local scale involved seven municipal actors and eight civil society representatives from neighborhood committees, local organizations, or private sector representatives.

### Stage 3: Analysis of regulations and interviews

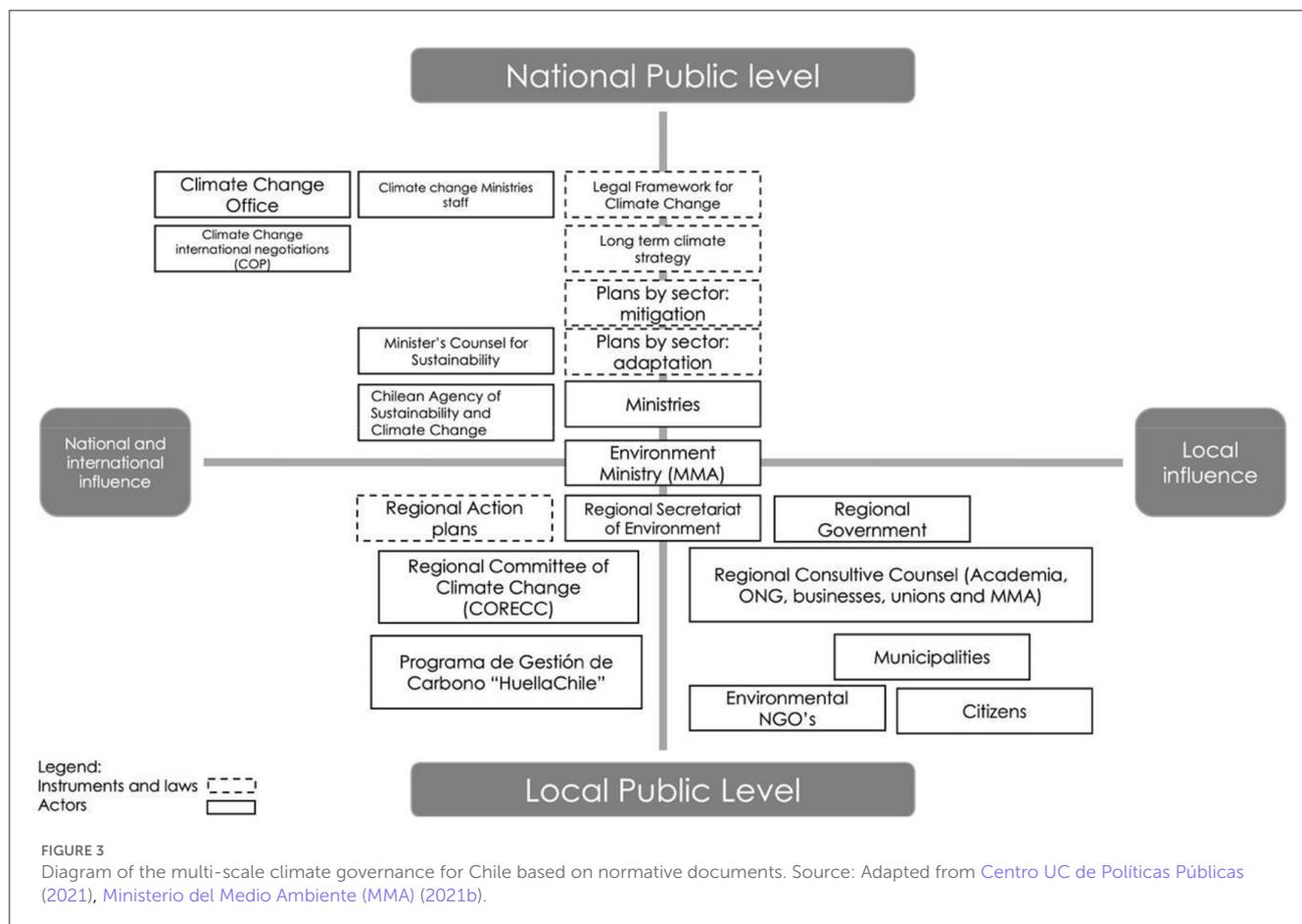
The analysis of regulations and interviews considered different activities. Based on these regulations and the adaptation of the proposal made by Corfee-Morlot et al. (2009), a scheme of multi-scale climate governance for Chile was created. It organized the actors, instruments, and laws in two axes. The position of actors within territorial levels from national to local is located on the vertical axis and the level of influence from the international/national level to the local influence is located on the horizontal axis.

The interview transcripts were processed using the qualitative data analysis software, ATLAS.ti version 9 (2021). A prior interview analysis generated categories and codes related to carbon footprint

TABLE 2 Total number of interviewees per type of actor and city/region.

Region–city/type of actor	Biobío–Coronel	La Araucanía–Temuco	Los Ríos–Valdivia	Los Lagos–Osorno	RM–National	Total
1. National	–	–	–	–	7	7
2. Regional	2	2	2	2	–	8
3. Communal	2	2	2	1	–	7
4. Civil society	2	2	2	2	–	8
Total	6	6	6	5	7	30

Source: Own elaboration, 2020.



dimensions and thematic axes. The codes were grouped into categories providing content analysis for each of the scales (national, regional, communal, and civil society).

The previous input allowed us to adjust the multi-scale climate governance scheme by adding actors or instruments and laws that had not been identified in the regulations and a heat map in relation to the topics given by the interviewees. Then, a scheme of interrelation between territorial levels and types of actors (Landauer et al., 2019) was developed. Furthermore, it identified the intensity of these links and their qualification according to whether they were mostly positive, negative, or neutral.

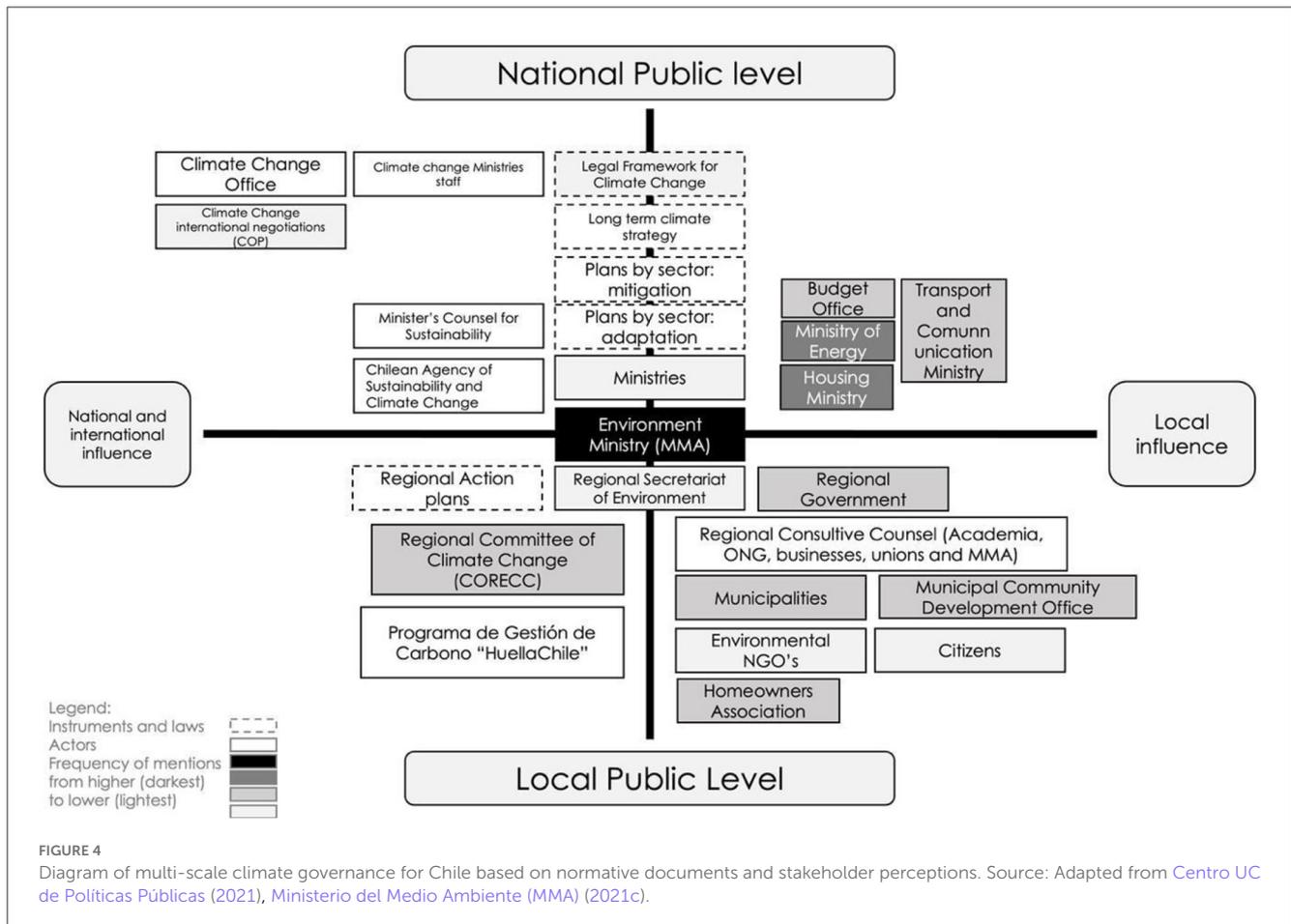
Finally, a synthesis of the results is made, discussing challenges of changing the public institutional framework, the interscalar

challenge for good governance practices, and the COVID-19 pandemic as a learning experience for the current public intersectoral model.

## Results

### Climatic institutionality in Chile

The normative review and the multi-scale climate governance scheme for Chile (Figure 3) revealed that the institutional framework in charge of climate change is strongly centralized and concentrated in the Ministry of Environment (MMA for its Spanish abbreviation). The latter incorporates the Climate Change Office,



which is a key agency in the country's relations with international programs, negotiators, and technical teams from other sectoral ministries. The Council of Ministers for Sustainability, the Chilean Climate Change Agency, and the sectoral ministries are also relevant. Among the key instruments and regulations created by these agencies are the Framework Law on Climate Change, the Long-Term Climate Strategy, and the Sectoral Mitigation and Adaptation Plans.

Beginning at a regional scale, the MMA itself coordinates actions through the Regional Environment Secretariats, which, in turn, align with the Regional Governments, the Regional Climate Change Committee (CORECC), and the Regional Advisory Councils. At this point, the main instrument is the regional sectoral action plans. At a local level, the municipalities are isolated and scarcely communicate with higher levels, as well as NGOs and citizens.

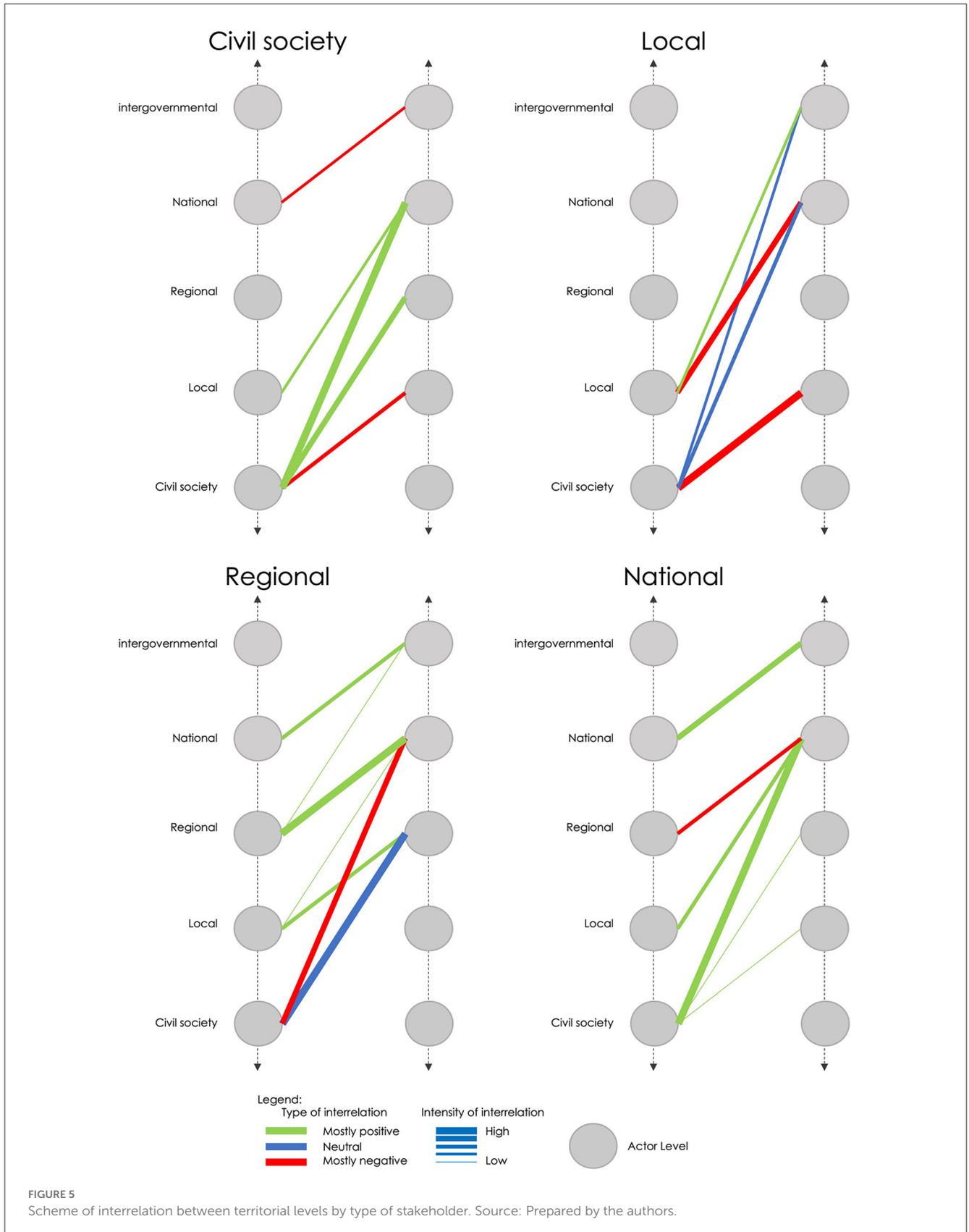
Regarding the same multi-scale climate governance scheme in Chile, including the perception of the interviewees (Figure 4), it is similarly observed that the MMA emerges as the central and most relevant actor, which confirms the model proposed. At this time, new actors were identified and added to the scheme: sectoral ministries (Ministry of Housing, Ministry of Energy, Ministry of Transport, and Budget Directorate of the Ministry of Finance) and the International Climate Change Negotiations, and the Framework Law on Climate Change were mentioned in the instruments.

At lower levels in the region, the most mentioned actor corresponds to the Regional Governments and the CORECCs, with the role of the SEREMI of the environment being more invisible in second place. At a local level, there were important mentions for the municipalities, especially their Community Development Board and the Neighborhood Boards, the latter two were not identified in the first scheme. Finally, the interviewees referred to environmental NGOs and citizens in their speeches.

### Interrelation between territorial levels

The results of the vision of the actors interviewed regarding the interrelationships between territorial levels are presented later. First, the vision of civil society actors, as well as the community, regional, and national institutions, based on the scheme of interrelationships between territorial levels by type of actor (see Figure 5; Table 3), are analyzed. Second, a synthesis that comprises the vision of all the interviewees (Figure 6) is shown.

Regarding civil society, the interviewees observe the strongest positive links between them and the national and regional level when subsidies are provided to reduce pollution and improve housing, as well as the link they create with the leaders. On the other hand, they observe negative links between them and the municipality, especially due to the socioeconomic characterization paperwork when they



apply for benefits, the high rate of personnel turnover, and communication breakdowns. In that sense, there is criticism

of the relationship between the country and international trade networks.

**TABLE 3** Summary of the perceptions of the institutional framework for climate change and carbon footprint measurement in Chile, organized by type of stakeholder.

Vision of the relationship	National actors	Regional actors	Communal actors	Civil society actors
Positive aspects	Technology provides better information to citizens	Good results motivate the participation of other stakeholders	Pandemic has been a lesson to learn about the needs of the community	Subsidies of different types to reduce pollution and improve housing
	In some areas, there are consolidated chains from the central to the local level that work well	Public-Private link serves to make faster progress on many issues	Instruments are widely built in a participatory manner	Link of leaders has become essential in the pandemic
	Decarbonization is good for communities	Articulation of communes from the regional level is effective in many issues	The pandemic allowed more collaboration between territorial levels	–
	Participating in the OECD or having international references is useful for gathering new ideas	Many thematic tables were coordinated and served concretely	–	–
	Having a CC law will help at different levels	In addition to the lack of CC regulations, there has been a great willingness to move forward	–	–
	Solutions at the local level were favored with the pandemic			
Negative aspects	The importance of citizens as consumers and generators of environmental impacts	Central level programs do not trickle down through the regional level	Mayors' priorities are not aligned with those of the communities	The socioeconomic characterization form is a barrier to apply for social benefits
	Not all communes can implement measures because they do not have the people or the infrastructure	Rural communities should be added	Budgets are centrally managed	International trade networks involved in the local economy
	The regulations do not always match the needs or problems of the citizens	There is a lack of regional instruments focused on sustainability	The environmental regulation is very centralized and low from the ministry	Communications do not reach all people in the same way
	There is a need to improve detailed information for decision making	International experiences are replicated, but they do not work because people are not the same as in other countries	Communication and technical language are a barrier to reaching communities	Changes of people in pandemics that were too rapid
	Dependence on international markets is very relevant	Communities are not educated on sustainability or climate change issues	–	–

Source: Prepared by the author.

In relation to communal actors, essentially municipal officials, they are observed as having the strongest negative relations when the interviewees commented on their interaction with civil society. They mentioned that the priorities of the mayors are not aligned with those of the communities, which adds to the difficulty of understanding the technical language of the problem. Similarly, another important negative relationship lies between the communal level and the national level. There is a strong criticism of excessively centralized regulations that come down directly from the ministry, as well as the fact that the budget is almost entirely managed from the central level. Neutral relations are also observed between civil society and the national and international levels, associated with the pandemic and the collaboration that occurred during the public health emergency. Finally, to a lesser degree, a positive relationship between the communal and international levels is observed, associated with the direct relation that exists between municipalities and international organizations in some specific cases.

At the regional level, there is a strong positive relationship between them and the national level, especially with respect to the high rate of stakeholders' participation in different civic

participation instances such as thematic roundtables. Then, in terms of intensity, the relationship between civil society and the regional level is neutral, especially due to the public–private linkage that is managed but hindered because local communities are not educated on climate change issues. Third, the relationship between civil society and the national level appears negative. According to their perception, the programs should go through them to make adequate adjustments because those programs come from abroad and would not be adapted to the local reality. Other positive relationships of lesser intensity emerge from the scheme between communal–regional, regional–national, and national–international levels, showing the importance of this level to a scalar transit in the relationships.

At the national level, the strongest linkage is with civil society because a digital governance strategy using state-of-the-art technology allows fast connectivity so that people may download information and documents in a second, as well as relationships built over many years. Then, the national and international relationships are observed to be intense and positive, due to the link with international referents such as the COP or the OECD. In the third level of intensity and in a positive way, the relationship with

the municipalities is observed because the COVID-19 pandemic allowed the solving of their problems more directly. At a negative level, only the relationship between the regional and national levels is observed, mainly due to the perception that, rather than collaborating in the dissemination of information and programs, decision-making is more difficult.

Finally, it can be seen in the synthesis scheme (Figure 6) that the link between civil society and the national and communal levels is negative. In this sense, the direct relationship that the central government tries to establish in this matter does not seem to be effective. The same scheme allows us to observe that in those cases where relations are scaled up between levels, it seems to show a better perception. New technologies emerge as an important issue and are presented as an opportunity to get closer to the community and, at the same time, are at risk of skipping the intermediate levels. In addition, there are higher levels of community participation and consideration. The regional level is valued by all stakeholders; however, it is one of the weakest.

## Discussion

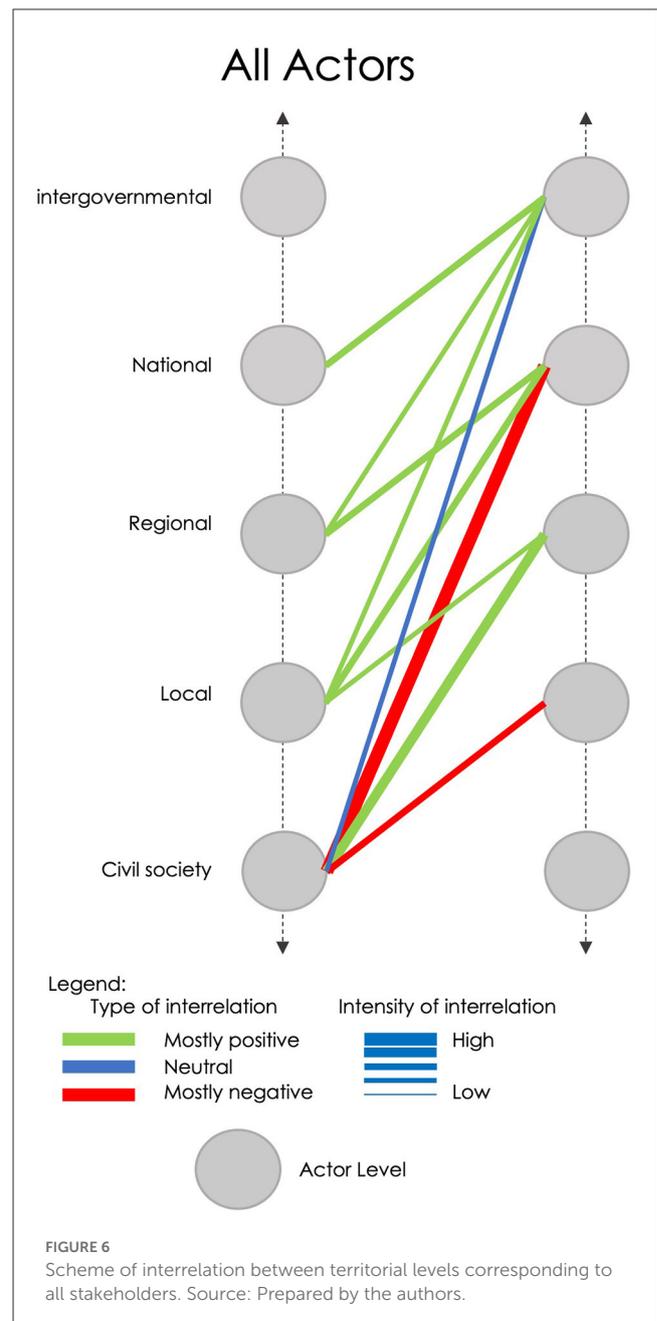
### Challenges of changing the public institutional framework in response to climate change

The contemporary environmental debate that was initiated in the 1970s at the Stockholm Convention forced countries to formally address environmental issues within their policies; however, it was not until 2015 at the United Nations Conference on Climate Change (UNFCCC-COP21) that world leaders decided to settle a global agreement to reduce greenhouse gas emissions (“Paris Agreement”). That same year at the General Assembly, 193 UN member states approved and adopted the Action Plan of the 2030 Agenda for Sustainable Development (17 SDGs), establishing a compass to guide global environmental policies and address the adverse effects of climate change with an integrated vision.

Governance systems at the local level have changed according to global trends in a context of environmental crisis and climate change, where supranational organizations and agencies have disseminated ideas that “work,” for example, the recent reduction of greenhouse gases and the SDGs in 2015.

Chile opened itself internationally to become a part of the Paris Agreement in 2015. This legally binding international accord on climate change was officially released in May 2017 through regulation D30/2017 of the Ministry of Foreign Affairs, which establishes as objectives: the maintenance of the global temperature by attending to industrialization processes, increasing the capacity to adapt to the adverse effects of climate change, and maintaining compatible financial flows toward a resilient development. However, since 2013, the MMA has been carrying out the Chile Footprint Program [Ministerio del Medio Ambiente (MMA), 2021b,c], which focuses on the quantification and voluntary management of greenhouse gas emissions at a corporate level responding to international standards in this area.

In this regard, according to the perception of most of the interviewees from different levels, the research showed that the national level is pressured by this international demand. This pressure is expressed by the concentration of the institutional



framework in a single ministry (MMA) and the knowledge and relevance of these issues at the national multilevel. The latter is reflected in the approach and concern for the environmental regulatory institutional framework. In this regard, considering the current situation in the context of climate change, it is urgent that environmental issues be transversal to all sectors and all levels (Quintana Solórzano, 2017).

### The COVID-19 pandemic as a learning experience for the current public intersectoral model

On the eve of 2020, the COVID-19 pandemic highlighted the difficulties and shortcomings in the environmental public

management system; however, it was a driver for the formulation of efficient channels and new models of communication between actors at different levels. Cyberspace generated general shortcomings. Even though the implementation of remote working conditions through digital technology worked, they posed negative impacts at economic and psychosocial levels (Battisti et al., 2022; Yamoah and Ul Haque, 2022).

According to the analysis of the interviews, the pandemic evidenced a facilitating action framework for some interscalar relations, especially from the point of view of national and communal actors, due to the direct transfer of economic resources and as a form of learning in the ways of relating, but not from the regional actors, who had little influence in this process, or from the civil society, who saw that their needs were not solved and identified a non-linearity in communication. In this context, Bulkeley (2005) states that urban governance of environmental protection involves relations between levels of the state and new spheres of authority in a network that defy the traditional distinctions between local, national, and global environmental policies.

It is important to note that, in this research, the actors perceive that the regional level is valued and should be the intermediary between levels; however, this situation does not occur, and disadvantages are observed in decision-making because of the centrality of its management. Therefore, according to Bulkeley (2005), the real challenge lies not only in the conceptualization of urban issues but also in the spatial and scalar visions and approaches that separate the global, national, regional, and local levels. Therefore, local levels are key in abrupt change events such as the pandemic and this study reveals the need to recognize the multi-scalar, interscalar, and trans-scalar approaches of actors facing climate change scenarios, local realities, environmental conflicts, and the consequent implications for this new way of living.

## Carbon footprint in household-energy consumption during and after COVID-19 in Chile

Household consumption contributes to 72% of global greenhouse gas emissions (Hertwich and Peters, 2009), mainly due to energy consumption and transport. In this context, homes and the lifestyles of those who inhabit them must be considered important objects within legislative and guiding institutional instruments of sustainability and climate change. Recently, the UN published a guide for consumption in times of COVID-19 to promote sustainable lifestyles at home (United Nations Environment Programme, 2020) aligned with SDG 12 “Responsible Production and Consumption” (ONU, 2020).

The Huella Chile Program does not consider household consumption as a contributor in the calculation of carbon footprint and/or the household as a focus of greenhouse gas emissions [Ministerio del Medio Ambiente (MMA), 2021b,c; Rojas et al., 2022]. According to the responses of the interviewed, especially civil society, accessing energy subsidies generated changes in their environmentally friendly practices regarding energy during the pandemic lockdowns (Rojas et al., 2021a). Similarly, it is the

national actors’ interviewees who contemplate the problems and the institutional management of the footprint in contrast with the other actors; however, there is a dissonance between the implementation of regulations and programs and the local realities, which are dissimilar and diverse in the territory.

Many of the interviewees stated that one of the big problems that existed was the sectoral view from the national to the local level (who most of the time showed ignorance), which prevented fluid communication between the actors, limiting the impact of the message regarding the importance of reducing the carbon footprint (Table 3).

A clear case mentioned in the interviews is that to manage the carbon footprint, the Ministry of Housing and Urban Planning (MINVU) cannot work alone, but it must work together with other ministries, such as Energy or Transportation, to generate projects in a more comprehensive way and that they really help to reduce the carbon footprint. This makes the need to implement a coherent body of co-constructed measures that are in tune with the commitments acquired by our country abroad (Paris Agreement, etc.), even more evident.

A concrete example that arose in the COVID-19 pandemic in 2020 was the municipal policies of Coronel and Valdivia on the development of family gardens in house patios. These were projects that involved different actors, both from civil society and the municipality, and which stood out in the focus group as a good space for education on environmental and carbon footprint matters.

In the context of the pandemic, it was observed that the success of public policies related to air decontamination will depend on the involvement of local actors in the cities of south-central Chile, for example, the replacement of heaters and the implementation of cycle paths. Given the region’s climatic characteristics and very particular customs, these laws should be reviewed jointly with said local actors in a broad consensus of citizen participation. Findings, both from the interviews and the surveys, were that homes preferably used wood heating for 8 months of the year—longer than the winter weather season of 4 months—and an increase in the use and purchase of automobiles.

## Conclusion

This study presented the perceptions of relevant stakeholders in Chile regarding carbon footprint and its associated policies in challenging times such as the COVID-19 pandemic.

The objective of analyzing climate change governance in Chile between territorial levels was achieved, evidencing a general framework that regulations and management are given with a major emphasis on the national level directly to citizens, skipping the regional and communal levels. This finding is of the utmost relevance, since it is linked to the decentralization problems that are claimed to exist in the country, makes state action inefficient in terms of CC, and prevents public policies from having territorial relevance.

Another relevant finding is the negative perception that citizens have regarding the communal level in actions related to carbon footprint improvements, especially because it is the level that

is supposed to come up with solutions to local problems. The criticisms that are collected at this point relate to the capacities of the municipalities in terms of CC. Above all, the interviewees expressed that political management does not acknowledge the real needs of the population. This finding is of paramount importance if we look forward to advancing toward the goals described in SDGs 11 and 12 since the most direct communication to and from the population is with the communal authorities.

Furthermore, the study shows how the COVID-19 pandemic taught us that new technologies are presented as an opportunity to get closer to the community but at the risk of skipping the intermediate levels. Today, in Chile, there is a *de facto* multilevel climate governance model based on international commitments. Although roles and concerns are observed at different levels, the weight is focused on the Ministry of the Environment and some sectoral ministries, observing concentration and centralism regarding the matter. All levels present positive and negative aspects with respect to their work, the most critical being relationships between the national–local level and civil society.

Finally and in relation to the SDGs, the effort to approach Goal 11: “Sustainable Cities and Communities,” Goal 12: “Responsible Consumption,” and Goal 13: “Climate Action” is observed with interest, especially in the actions taken by the government; however, in light of the results, progress should be made in strengthening the transfer between territorial scales from the national to the regional and communal levels to reach citizens with territorial relevance and from there in the opposite direction, passing through the communal level, then regional and finally national so that the Chilean government can be an adequate voice of, and internationally represent, the problems and conditions that are manifested throughout the country.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Ethics statement

The studies involving human participants were reviewed and approved by Comité Ético Científico de Ciencias Sociales, Artes y Humanidades of Pontificia Universidad Católica de Chile in 2020.

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The patients/participants provided their written informed consent to participate in this study.

## Author contributions

Writing—original draft preparation and review and editing: KB, PG, CC, GS, and CO. Project administration and funding acquisition: KB. All authors have read and agreed to the published version of the manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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