Regional Government Contribution to Santiago's Climate Risk Adaptive Capacities

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Abstract

Santiago is exposed to four significant climate hazards: floods, heat waves, landslides, and drought. Moreover, its segregation and unequal access to urban services are factors that exacerbate the region's vulnerability to climate risk. The literature and specialized organizations, such as the IPCC and OECD, have emphasized the importance of city governments in cities' adaptation to climate risk, provided that they can address urban vulnerabilities and enhance the city's adaptive capacity. In Chile, significant decentralization measures were implemented in 2021; therefore, this essay discusses to what extent the new regional government institutionality contributes to strengthening Santiago's capacity to adapt to climate risks. Although the current administration has promoted interesting initiatives to address this issue, Santiago's ability to adapt to climate risk is limited, as the institutionality leaves Santiago's government ill-equipped to address the city's vulnerabilities and respond to climate risk. However, the new institutional framework opens possibilities regarding the capacities to articulate multiple actors.

Key words: Climate Risk, Cities Adaptation, Adaptive Capacities, Urban Vulnerability, Regional Government

Resumen

Santiago está expuesta a cuatro importantes riesgos climáticos: inundaciones, olas de calor, desplazamiento de tierra y sequías. Además, su segregación y desigual acceso a los servicios urbanos son factores que agravan su vulnerabilidad al riesgo climático. La literatura y organizaciones especializadas, como el IPCC y la OCDE, han destacado la importancia de los gobiernos municipales en la adaptación de las ciudades al riesgo climático, siempre que puedan abordar las vulnerabilidades urbanas y mejorar la capacidad de

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adaptación de la ciudad. En Chile, en 2021 se implementaron importantes medidas de descentralización, por lo que este ensayo analiza en qué medida la nueva institucionalidad de los gobiernos regionales contribuye a fortalecer la capacidad de adaptación de Santiago a los riesgos climáticos. Aunque la actual administración ha promovido interesantes iniciativas para abordar este tema, la capacidad de Santiago para adaptarse a los riesgos climáticos es limitada, ya que la institucionalidad deja al gobierno de Santiago mal equipado para abordar las vulnerabilidades de la ciudad y responder a los riesgos climáticos. Sin embargo, la nueva institucionalidad abre posibilidades en cuanto a las capacidades de articulación de múltiples actores.

Palabras clave: riesgo climático, capacidades adaptativas, adaptación de las ciudades, vulnerabilidad urbana, gobierno regional

Introduction

Analyzing how climate risk intersects with cities and urban settlements is relevant because, as argued by the IPCC (2014), "disasters are most acutely experienced at the local level. [...] The impacts of climate extremes and weather events may threaten human society at the local level" (p. 293). Furthermore, most of the world's population will be affected due to the people's undeniable tendency to live in urban areas. In 2018, 53% of the world's population lived in cities, but, by 2050, this percentage is projected to increase to 68% (UN, 2018). A key characteristic of climate change is its unequal distribution of its impacts in urban settlements, affecting more vulnerable groups whose capacities to mitigate and adapt to climate risk are limited.

International bodies, such as the IPCC (2014), and the urban literature have emphasized the importance of city governments being active players in addressing urban climate risk. As Matsumoto Tadashi and Ledesma Bohorquez pointed out:

> many of the domains that fall under the jurisdiction of cities – land use planning, zoning, water provision, sanitation and drainage, housing construction, urban regeneration, economic development, public health and emergency management, transport, environmental protection are directly vulnerable to climate change impacts. (2023, p. 10)

Indeed, the functions and responsibilities of city governments vary across the world, with some countries being more decentralized than others. However, in this regard, there is no optimal institutionality for regional governments, whose climate risk performance will depend on the instruments implemented and the context of each country (OECD, 2022). Particularly, Chile is one of the most centralized countries in the OECD, yet it has implemented several significant reforms to advance its decentralization agenda. The most recent reform was in April 2021, when a new regional institutional framework was introduced to

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regulate the country's regional governments in Chile. In this context, this essay discusses to what extent the new regional government institutionality contributes to strengthening Santiago's capacity to adapt to climate risks.

To address that question, the first section presents the main variables of climate risk, identifying vulnerability and adaptive capacity as key components for cities' climate risk adaptation. The following section characterizes the hazards of Santiago and provides an overview of the city's vulnerability. The third section analyzes to what extent the modification introduced in 2021 to regional government strengthens Santiago's adaptive capacity to climate risk. Finally, the last section contends that Santiago's adaptive capacity to climate risk is limited, as the institutional framework leaves Santiago's government ill-equipped to address the city's vulnerabilities and respond to climate risk. However, the new institutional framework opens possibilities regarding the capacities to articulate multiple actors.

Cities and Climate Risk

Climate risk has a profound impact on cities, significantly affecting the daily lives of their residents. Furthermore, climate risk, which is associated with long-term stress, will affect urban systems in unexpected ways and exacerbate extreme weather events (Kim and Lim, 2016). Furthermore, there is evidence that climate change disproportionately affects vulnerable groups (Gough et al., 2019). To understand why certain groups are more at risk from climate change, it is helpful to use the IPCC's (2014) conceptual framework, which states that risk is an interaction of three variables:

> **Exposure**
> The presence of people; *livelihoods*; species or *ecosystems*; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected.
>
> **Hazard**
> The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, *livelihoods*, service provision, *ecosystems* and environmental resources.
>
> **Vulnerability**
> The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. (pp. 123-128)

To manage the climate risk, cities require a process of system change (Kim and Lim, 2016). In this vein, a traditional path to addressing climate risk is

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adaptation, which "is made up of actions throughout society, by individuals, groups and governments" (Adger, Arnell, and Tompkins, 2005, p.77). Thus, cities are called upon to be active players in addressing climate risk because "variables that can determine the extent of a city's ability to adapt include the structure and capacity of institutions, presence of adaptation and mitigation programs, and motivation of change agents" (Mehrotra et al., 2009, p. 9).

Overall, climate risk adaptation refers to a process "through which an actor is able to reflect upon and enact change in those practices and underlying institutions that generate root and proximate causes of risk" (Pelling 2010, p. 21). Pelling, O'Brien, and Matyas (2015) recognize three different levels of cities' adaptation: first, adaptation as resilience, which can be described as measures to maintain the functionality and equilibrium of the system in the face of external hazards. Doing so, their understanding of resilience is limited to the system's ability to return to and maintain its previous equilibrium. The next level is "transitional adaptation", which refers to incremental adjustments over time that can transform a system without affecting its critical points. A third level, called "transformation adaptation," involves profound changes in a system by addressing the root causes of climate risk and vulnerabilities.

Fünfgeld (2010) points out that numerous studies have demonstrated that the vulnerability of dwellers significantly determines climate risk in cities from low- and middle-income countries. Therefore, cities' climate risk adaptation is strongly connected with vulnerabilities and their adaptive capacity, which refers to "institutional attributes of the city and its actors that determine the degree of its capability to respond to potential climate change impacts" (Mehrotra et al. 2009, p.9).

Climate Risks in the Metropolitan Region

As it is argued above, there is evidence that climate change disproportionately affects vulnerable groups (Gough et al., 2019). In the metropolitan region, people living in informal settlements or substandard housing are frequently affected by weather events or heat waves. By doing so, these weather events commonly bring cascading urban impacts, disrupting the daily lives (including water, energy, and transportation) of city inhabitants. The following section presents the primary hazards of the region, along with their impact on various sectors. Following the hazards of Santiago, some of the urban vulnerabilities of Santiago are described.

A. Hazards in the Metropolitan Region

Researching the threats and impacts of climate change is fundamental for decision-makers to design appropriate adaptive policies across all sectors. According to the 2020 risk report for the metropolitan region, there are four climate hazards to which the region is exposed: floods, heatwaves, landslides, and drought. The following table presents the effects that these hazards can have on different areas of society.

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	Drought	Landslides	Floods	Heat waves
Tourism sector (mountains, vineyards)	Landscape change and fragmentation. Decrease of flows in rivers where outdoor activities are practiced. Loss of landscapes with conservation value (National system of protected areas, private and other international designations). Decrease in snow cover.	Closure of mountain and foothill parks due to avalanches. Unsafe conditions for users of mountain parks.	Closure of mountain and foothill parks due to unsafe conditions for users.	Stress in the economic chain of production, storage, production and consumption.
Industrial sector	Conflict over water use in key sectors of the matrix such as mining. Reduced productivity. Loss of jobs and economic activity in general.		Flooding of industrial areas and interruption of work.	Increase in food prices.
Food sector	Loss of crops and soils. Stress in the economic chain of production, storage, production and consumption. Increase in food prices.	Decline of the sector, which is mainly characterized by small-scale family livelihood enterprises.	Destruction of crops due to flooding.	Disruption of the food production and distribution chain. Disruption of refrigeration systems and the cold chain due to power outages. Food shortages or partial distribution due to the above points.
Agricultural and wine-growing sector	Increase in food prices. Loss of agricultural areas. Erosion of fertile soil. Conflicts over water rights.		Destruction of crops due to flooding.	Loss of crops and harvests due to high temperatures.
Electricity grid (energy)	In case of drought on a national scale, a deficit in hydroelectric dams may occur. Energy shortages as a result of the above.	Cutting of services due to the knocking down of poles and cables.	Disruption of the local urban network service.	Overloading of the grid due to excessive use of air-conditioning systems. Supply cut-off.
Sanitary services (water)	Water shortages in reservoirs. Disruption or reduction of residential water supply.	Turbidity of water in treatment plants.	Turbidity of water in treatment plants. Flooding of drainage systems.	Disruption of pumping systems due to grid overload if there are no redundant power systems.

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	Drought	Landslides	Floods	Heat waves
Urban services		Interruption of roads due to landslides and mudslides, particularly in mountain areas (Andes and Coast). Interruption of services due to road closures.	Waterlogging of roads and underpasses. Erosion of roads. Interruption of services due to flooding of roads.	Interruption of internet and cellular networks due to power outages. Disruption of normal operation of services.

Source: Informe de Riesgo Climático para la región Metropolitana, 2020. Subsecretaría del Medio Ambiente.
https://www.paiscircular.cl/wp-content/uploads/2020/02/Informe_Riesgos_Climaticos_RM.pdf

B. Metropolitan Region Vulnerabilities

The degree of vulnerability varies according to the level of exposure, sensitivity, and adaptive capacity (IPCC, 2014; Carter et al., 2015). In terms of exposure, the Metropolitan Region has geographical characteristics that make it even more susceptible to the impacts of climate change. According to the criteria defined by the United Nations, Chile meets five of the nine vulnerability criteria (semi-arid zone, territory susceptible to natural disasters, area prone to drought and desertification, urban areas with air pollution problems, and mountainous ecosystems). In addition to these natural characteristics that make the region more vulnerable to climate change, there are urban and social components that accentuate the region's sensitivity. Although it is not possible in this essay to address the regional urban and social vulnerabilities in-depth, an attempt will be made to provide a general overview.

Overall, it is relevant to mention that Chile is the OECD country with the highest probability (16.3%) that a person from quintile three will move down to quintile one within four years, and the country with the highest probability (11.3%) that a person from quintile four will move down to quintile one. One highly vulnerable group in terms of income is the elderly population, where 60% of them have a monthly income of less than CLP $197,344. This situation is worsened when considering women's income, as 60% earn less than CLP $165,137[1] per month. This low income also extends to the rest of the region's population, as 60% of families have a monthly income of less than CLP $550,734. In contrast to this low income, 10% of the region's population has an income equal to or higher than CLP $4,237,831[2].

Inequality in terms of income has led to the creation of a segregated region. Agostini, Hojman, Román, and Valenzuela (2016) present a study on urban

1 Available at: http://www.desarrollosocialyfamilia.gob.cl/storage/docs/DOCUMENTO_ADULTO_MAYOR_RMS_CASEN_2017.pdf

2 Available at: https://www.desarrollosocialyfamilia.gob.cl/storage/docs/DOCUMENTO_POBREZA_Y_DISTR_ING_RMS_CASEN_2017.pdf

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income segregation between 1992 and 2002. One of the study's main results is that 53% of the inhabitants of the 10% of households with the highest income would have to relocate to less homogeneous sectors to achieve perfect integration in the space.

This segregation by income in the region correlates with access to urban amenities, such as pharmacies, shopping centers, educational institutions, green spaces, and hospitals. The Urban Quality of Life Index (ICVU, explaining its components) 2019 establishes that the communes with the highest quality of life rankings are those with the highest incomes (Vitacura, Las Condes, La Reina, Lo Barnechea, Providencia, Santiago, and Ñuñoa) (Hurtado, 2019).

In addition to the natural, social, and economic vulnerabilities already mentioned, the region also faces urban services that exacerbate urban vulnerabilities. Vicuña, Orellana, Truffello, and Moreno (2019) show the dramatic contrasts in connectivity and mobility across the region between high-income and low-income areas. More than 70% of the camps have poor, very poor, or no access to this system, and more than 40% of the *villas de blocks* are in the same situation (Makito & Correa, 2015).

New Regional Institutionality and Adaptive Capacities of Santiago

So far, this work has discussed adaptation as a path for addressing cities' climate risk, by highlighting cities' vulnerability and adaptive capacities as key factors. Furthermore, it is mentioned that for cities' adaptation, city governments are considered crucial actors as many of their functions and responsibilities are related to climate risk causes and impacts. In Chile, a recent reform (2021) modified the institutional structure of regional governments through Act 21074, establishing elections for the regional ruler, replacing the previous nomination system for the president, and transferring functions and responsibilities to regional governments. Therefore, in this section, it is discussed to what extent the new regional government institutionality contributes to strengthening Santiago's capacity to adapt to climate risks, given its hazards and vulnerabilities.

The election of the regional ruler lends greater legitimacy to the leader, enabling policies, plans, and programs to be aligned with the interests of the region's inhabitants. Furthermore, it also means greater control from the inhabitants over those who run the region. Another push-forward element at the political level is the creation of an advisory committee (integrated by local governments) and a Metropolitan Area Management System (Administración de Áreas Metropolitanas). These new institutional spaces are undoubtedly of great value in strengthening regional adaptive capacity, as the importance of articulating different spaces at various scales for urban climate adaptation is widely recognized (Dodman, 2019; Carter et al., 2015; Adger et al., 2005).

A significant weakness in the new regional institutionality is the lack of channels or spaces for participation that connect citizens and stakeholders with the

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regional government. This poses a barrier to collaboratively addressing climate risks. Community, universities, civil organizations, or businesses working together can foster a better understanding of climate risk and challenges for cities, enhancing the decision-making process and Santiago's adaptive capacities. As climate risk involves knowledge, risk evaluation, communications, risk management, and urban effects on multiple actors, a participatory management strategy is required (Renn, 2018). Nevertheless, despite the absence of a relevant institutional space for stakeholder participation, the current ruler has implemented multiple arrangements to facilitate their involvement.

In terms of management and planning, regional governments have a homogeneous package of competencies, services, and programs common to all regional governments. The government's functions encompass four key areas: territorial planning, productive development, social development, and cultural development. The functions of the regional government in these matters refer to designing, elaborating, approving, and implementing policies, plans, and programs for the region's development. Nevertheless, these spheres of action are limited, as they overlook areas such as transportation, which is central to generating measures to adapt to climate change risks.

Those limitations may be remedied over time as the law establishes that the president may transfer one or more competencies from the central government to one or more regional governments, either temporarily or permanently. Unfortunately, this formula appears problematic, as the transfer may be influenced by the degree of proximity between the regional government and the central government, which undermines the institutional capacities that would justify a transfer of powers and functions. On the other hand, the power transfer is always complex because it is counterintuitive for a political authority to reduce its political functions. In this sense, the current national government had a campaign promise to transfer more power to regional governments; however, this looks unlikely within the last year of its rule.

Although regarding environmental responsibilities, the regional government still plays a marginal role (OECD, 2024). There are interesting institutional mechanisms to coordinate multilevel actions, such as the Comité Regional de Cambio Climático (CORECC) 'Regional Climate Change Committee'. Notably, the CORECC seeks the implementation of adaptation measures, and it is integrated by civil society, central government, representatives of local government, and the ruler of regional government, who also presides over the committee. Furthermore, the current ruler of the region has implemented several diagnostics, strategies, and plans that address —to some degree— climate risk; some of these include local water management plans, the regional development strategy, and the action plan for climate change.

The weakest capacities lie in economic matters, as the law leaves no room for regional governments to finance themselves through territorial taxes, except for revenues from mining patents, aquaculture patents, and casino licenses. Moreover, the institutional framework does not consider significant regional financial mechanisms aimed at reducing territorial gaps that characterize the region

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and the country. Overall, the regional government has a significant financial dependence on either the ministerial budgets of the central government or the National Regional Development Fund.

Finally, regarding economic limitations, in 2023, the current government proposed a new law to the parliament to empower regions. The proposal aims to create new income sources, create a more robust public budget control system, and enhance mechanisms for more flexible and autonomous financial management. Moreover, the proposal includes a Fondo de Equidad Interregional (Interregional Equity Fund) that would seek to reduce development gaps between territories. Unfortunately, all these proposals are still being discussed slowly by the parliament.

Conclusions

Santiago is exposed to four primary climate hazards: floods, heat waves, landslides, and drought. Moreover, segregation by income and unequal access to urban services, such as pharmacies, educational centers, green areas, or hospitals, are social components that accentuate the region's vulnerability to climate risk. In this regard, the role of the regional government is marginal, as it is ill-equipped to address such city vulnerabilities, which limit Santiago's ability to adapt to climate risk.

In terms of management, the regional government's institutional framework does not establish significant powers, functions, or links with any emergency system. The current institutional design is marked by providing a set of planning and management tools mainly for short-term and smaller-scale matters, despite the importance of urban governments having powers in matters of infrastructure and urban services (Dodman and Satterthwaite, 2008). On the other hand, the regional government's economic constraints are significant, establishing a dependency on the central government. This dependence could impact long-term projects aimed at mitigating and adapting to climate risk. Thus, the restricted management and economic functions of the regional government negatively impact the city's capacity to respond to climate risk.

Despite the limitations mentioned above, the new institutional framework opens possibilities regarding the capacities to articulate multiple actors. Interesting spaces are institutional instruments such as CORECC, the Metropolitan Area Management System, or the Committee of Municipalities. However, the management, dynamics, and results will need to be evaluated over a more extended period.

One significant step introduced in 2021 was the democratic election of the regional ruler, marking a shift away from the old, hyper-centralized regional institutionality. However, the reform was short concerning stakeholder participation because it did not consider any relevant instruments or space for participation. Community, universities, civil organizations, or businesses working together can enhance the decision-making process and build cities' adaptive

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capacity. Although these limitations have been covered to some degree by the current regional ruler, it still depends on sporadic leadership. In this regard, it would be helpful to analyze the actors, intensity, result, and institutional arrangements under which they were included.

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