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Are Citizens Ready for Active Climate Engagement or Stuck in a Game of Blame? Local Perceptions of Climate Action and Citizen Participation in Chilean Patagonia

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Abstract: Deep structural transformations aimed at strengthening climate action and community participation are occurring in Chile, especially after the social unrest of October 2019. The ongoing political crisis has even generated the unprecedented possibility of writing a new constitution through an entirely democratic process. This article explores to what extent these structural transformations are also associated with cognitive and relational changes in the population, especially in terms of community participation. An online survey (n = 1.117) was applied to people over 18 years old in Punta Arenas in November 2020. This is the southernmost city of the American continent, one of the areas most affected by climate change, highly isolated from the rest of the country, and with a strong regional ecological identity. Results show that climate change is perceived as the main environmental problem affecting the city, with multiple negative consequences, but also with some potentially positive impacts. At the same time, environmental and constitutional expectations suggest the state of the environment is deemed to be critical for the future of the city. However, a traditional top-down understanding of community participation still prevails as most participants perceive the citizens' role in dealing with environmental issues as limited to individual, passive, and reactive actions, or reduced to being responsible consumers. These results show that transforming institutions, rules and regulations alone does not guarantee a broader engagement of local communities in more ambitious, committed, and lasting climate action, even with a high climate change concern in the population. Creating strategies aimed at more profound cognitive and relational changes from a bottom-up perspective will also be necessary to avoid negative transformation trajectories.

Keywords: climate change; transformation; Chile; constitution; community participation

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1. Introduction

Chile is experiencing deep structural transformations aimed at strengthening climate action and community participation through institutional, legal, and likely constitutional changes. This is strongly related to the ongoing political crisis, which was in evidence in October 2019, challenging traditional Chilean institutions, the political parties' regime, and the neoliberal system designed and implemented during the dictatorship (1973–1990). Along with demands for better health services, public education, a fairer retirement system, and higher salaries—all issues related to deep structural inequalities—increasing community participation, concern for the natural environment, and climate change have been

at the forefront of social demands, as well as calls for an effective decentralization of the country [1,2]. In this complex scenario, one of the main outcomes of this crisis has been the unprecedented possibility of writing a new constitution through an entirely democratic process. However, despite the depth, magnitude, and pace of these changes, it is unclear how the general population perceives their role in this new Chile, especially regarding climate change. This article reports the results of a survey aimed at exploring to what extent these structural transformations are also associated with cognitive and relational changes, thus reflecting a new understanding of both the environment and community participation in Chilean society.

This study is part of a wider transdisciplinary research project, whose main goal was to contribute to the community construction of constitutional bases for a society resilient to ongoing and future climate scenarios, conducted during 2020–2021 in Punta Arenas. This is the southernmost city of the American continent, the capital of the Magellan and the Chilean Antarctic Region, located on the Strait of Magellan in Patagonia. The decision to select Punta Arenas was threefold. First, the Region of Magellan is one of the areas most affected by climate change, and it is already experiencing dramatic changes, especially in the snow covering and temperature; second, it is a highly isolated region that has had to deal historically with multiple difficulties associated with the centralized Chilean State; third, diverse studies have shown that its inhabitants express a strong regional ecological identity, which integrates their particular and historical relationship with the natural environment of the region, and the difficulties of establishing a settlement in such hostile geographic and climatic conditions [3,4].

We use the transformation approach to climate change as a framework to analyze the results and the study context. There are different perspectives on transformation [5]. These include systemic approaches, in which special attention has been paid to the capacities for innovation, adaptation, and learning of socioecological systems [6,7], as well as to the transitions of sociotechnical systems [8]. On the other hand, structural approaches address transformations as historical processes and observe radical changes of a political or economic nature in social relations determined by power [9,10]. Finally, the enabling approaches integrate the previous two, paying attention to the agency capacity and the transformations' direction and objectives [11–13]. Here, transformation is defined as a change in the fundamental attributes of natural and human systems [14].

Transformations are collective or individual adaptations. They can be planned, but require autonomous adaptations by individuals and organizations [15]. In this sense, transformations are dynamic and complex processes requiring simultaneous changes in different systems [5,16]. Transformation also refers to a broad and often irreversible set of changes that imply profound innovation in the economic, technological, and social environments. These include changes in the way of thinking, decision-making, actions, behavior, power structures, governance systems, values, predefined goals, how energy is used and produced, and how infrastructure and natural resources are managed [17,18]. Accordingly, transformation can unfold in four domains [16]: (1) cognitive (values and thinking), including significant shifts in societal beliefs, norms, values, and understandings, which may manifest as radically new concepts, ways of viewing the world or notions of progress; (2) structural (institutions and governance), referring to significant shifts in institutional arrangements and governance processes, such as major policy change, institutional reform, or new feedback and accountability mechanisms; (3) relational (interactions among actors), involving significant shifts in relationships between actors and institutions, such as moving from siloed to integrated decision-making processes, new collaborations among diverse stakeholders that enhance science–policy–practice linkages, or new accountabilities between public, private and civil society actors; and (4) functional (system behavior/outcomes), including significant changes in the behavior and function of a system, for example, the diffusion of innovative sustainability practices, or changes in technology that reshape human activities of communication, production, and consumption. This may include the significant technological or practical advances that disrupt the status

quo and allow opportunities for more radical changes and sustainable outcomes [18]. Many of these domains are mutually reinforcing, and multiple domains may need to change for transformation to occur [5].

Even if well-intentioned, the transformation could take a positive or negative trajectory. The former occurs when society adjusts and adapts by acting quickly to prevent the deepening of vulnerability and climate change impacts or implementing transformation action characterized by a decrease in greenhouse gas emissions and accelerated sustainability for social and ecological systems [19,20]. The latter happens when transformation processes strengthen dominant interests that are not socially progressive and contribute to perpetuating patterns of vulnerability [20–22]. In this study, the transformation approach allows identifying the type and depth of changes occurring in this Region and projecting certain trajectories.

1.1. Structural Transformations toward Climate Action

The unprecedented constitutional process that started in November 2019 occurs in a post-Paris Agreement context, with severe climate change impacts already affecting the country (e.g., a 12-year mega-drought and massive wildfires) and numerous biodiversity threats. Many people with an environmental agenda were elected to be part of the constitutional assembly, representing the interest in a profound transformation of the human–nature relationship [23,24]. As such, a considerable number of constitutional articles in the draft phase, which will be submitted to a referendum, consecrate environmental principles related to environmental rights (e.g., the right to environmental health, the human right to water, the rights of nature, animals' wellbeing right), environmental state duties, and an environmental institution framework. Additionally, the draft recognizes "the duty of the State to adopt actions for the prevention, adaptation, and mitigation of risks, vulnerabilities, and effects caused by the climate and ecological crisis".

Among the principles, the draft states just climate action in view of adopting the best possible decisions in the long term, articulating: 1. incremental actions that seek to gradually make progress without affecting the essential attributes of social–ecological systems to achieve mitigation and adaptation goals, without ever going back (principle of non-regression) and progressively increasing ambition (principle of progressivity), as stopping means regressing; 2. transformative actions that imply radical changes in the attributes of social–ecological systems, either expanding, reorganizing, redirecting, or innovating in terms of beliefs, norms, and values, institutional arrangements, production and consumption systems, relationships among actors, etc. [19,25,26].

If the assembly's proposal is approved in the referendum, this could be one of the first constitutions addressing climate change more deeply, holistically, and transversally, with a solid pro-environmental component. This would help to overcome some of the contradictions and limitations of the Constitution of 1980 created during the dictatorship (e.g., the permanent tension between the right to a healthy environment, the property right and the freedom to exercise any economic activity) and establish a more ambitious and transversal form of participation through mechanisms of direct democracy (it will also be the first constitution in Chile that arises from an entirely democratic process; the first legal document prepared under the parity rule between women and men; and the first one with seats reserved for indigenous communities).

It is important to note that the Chilean Higher Courts (Courts of Appeals and Supreme Court) have also played a key role in advancing these changes. For example, some cases submitted through the constitutional protection remedy in connection with climate change have been brought as a consequence of the eventual violation of rights caused by the increase in magnitude and frequency of extreme events that would be associated with climate change, such as floods, fires, and algal blooms. At the same time, the Tribunals have reinforced the importance of participation, information, and justice access according to present environmental legislation and the Rio Declaration of 1992 [27].

The emphasis on participation in all these structural transformations could also be interpreted as a response to what scholars have been pointing out for many years: the reduced influence of citizens in Chilean environment-related institutions and regulations through mechanisms aimed at keeping people informed or just collecting the community's opinions [28–31]. In most cases, these procedures have not deterred authorizations to develop private initiatives that have jeopardized communities' wellbeing and the environment's protection. This situation has been at the core of multiple socio-environmental conflicts, including those associated with the environmental impact assessment system (EIA). Several studies [32–34] have questioned its legitimacy, as the citizens' participation mechanism, although compulsory, is symbolic, non-binding, and insufficient. In fact, legally, the incidence of local communities is restricted. Although the environmental, institutional framework considers public participation in the management instruments (policies, plans, standards, environmental impact evaluation), the implementation of each participation system instrument is unequal. This is the main source of socio-ecological conflicts. For instance, environmental impact evaluations are generally made without considering the territorial planning context. Consequently, local communities do not have a chance to influence critical issues such as land use, what type of projects or development are the most adequate for the place they live, which ones are more compatible with their territorial vocation, or the type and degree of impacts they are willing to tolerate.

All of this has increased the lack of social legitimacy of the environmental institutions and the pressure to change them, which is at the core of the ongoing constitutional debates [35]. Thus, Chile is experiencing a historic, profound, and unprecedented transformational process, at least in the structural dimension, that could create the conditions to reshape the relationship between people and public institutions at multiple levels [21].

1.2. Relational and Cognitive Transformations in Community Participation

As pointed out by the IPCC [14,17], limiting global warming to 1.5 °C will require unprecedented societal transformations to implement a strong, rapid, and sustained reduction in greenhouse gas emissions, as well as locally relevant adaptation strategies, all of which demands broader community participation at multiple levels. Certainly, all the structural changes occurring in Chile are creating a positive context to address these challenges. However, transforming institutions, rules and regulations alone does not guarantee a broader engagement of local communities in more ambitious, committed, and lasting climate action, even with a growing environmental awareness and climate change concern in the population [13]. In the case of Chile, power asymmetries, a profound lack of trust in the political system, and social inequalities have severely impacted how people perceive the possibilities to influence or be part of climate-related decisions and actions [36–39].

On the one hand, environmental organizations and demonstrations have proliferated in Chile in the context of the multiple socio-environmental conflicts occurring in the country in the last decade [40,41], and climate change-related organizations have formed important national networks (e.g., Civil Society for Climate Action SCAC) likely reflecting the growing concern on this issue among the population [42]. On the contrary, according to the Third National Survey on the Environment and Climate Change [43], less than 5% of the population had participated in initiatives related to environmental issues, despite very high levels of concern about climate change impacts and the state of the environment. Moreover, the presence of environmental organizations in the constitutional assembly might well reflect their capacity to organize themselves and be a legitimate democratic option for this task, but that does not necessarily mean a profound change in the way most Chileans understand community participation (e.g., only 41.5% of the people participated in that election). Thus, this push for more participatory institutions might be another expression of the top-down culture, and the representative and hierarchical type of democracy in which citizens delegate to others most responsibilities (this time to social organizations instead of traditional political parties), rather than a broader interest in actively engaging in environmental decision-making processes or climate action. It might also reflect a particular

way of understanding community participation held only by certain political groups, social organizations and academic circles, and not necessarily the general public.

All in all, the literature suggests that along with efforts to improve our understanding of the multiple barriers to developing structural transformations toward a more participatory society, it is paramount to dig deeper into the cognitive and relational changes that are also needed to implement more ambitious climate action. The literature also shows us the importance of innovation in transformation, and how it must operate at collective and individual levels. For decades, Chilean scholars have focused their analysis mainly on institutional, legal, and constitutional limitations, but now structural changes are occurring, or are likely to occur. It is unclear what will happen with the people who are not part of social organizations or political parties regarding how they perceive their role in this new institutional scenario. However, transformational approaches help us to think about how to address the challenges these changes impose on structures, people, and relationships. On the other hand, the transformation framework highlights the importance of addressing these issues, showing the different dimensions and trajectories of change and the need to explore them using an integrative perspective.

1.3. The Case Study: Punta Arenas, the Southernmost City in the World

The Magellan and the Chilean Antarctic Region includes the southern part of Patagonia, the western section of Tierra del Fuego, and the adjacent archipelagos. It covers 132,033 km^2, representing 17.5% of Chile's surface [44]. Approximately 50% of the surface corresponds to protected wild areas, including reserves, natural monuments, and national parks, that provide diverse, numerous, and important ecosystem services at local and global levels [45]. Its current population is 131,592 inhabitants [46], concentrated mainly in the communes of Punta Arenas, Puerto Natales, and Porvenir, which alone account for 95.5% of the total regional population. Indicators of poverty levels are among the lowest in the country [47], and inequality indicators are below the national average [48]. It is one of the country's regions with the highest level of development.

The climate of the Magallanes region (southern South America in the definition of the IPCC-AR6) features a maritime climate, with annual mean temperatures around 5–10 °C and about 5 °C differences between summer and winter (Figure 1). It is characterized by year-round precipitation of about 500 mm, with a small annual cycle and relatively small interannual variability [49]. The region is under the year-round influence of the southern westerly winds, with peak wind magnitudes during summer [50]. Over the period 1979–2018, the region has seen positive temperature trends of the order of 0.1–0.2 °C per decade (Figure 1a), which is statistically significant only in some parts of the region. In recent years, there has been a significant decline in the snow cover [51], which is correlated with a statistically significant winter warming of Punta Arenas (0.71 °C, between 1972 and 2016). In most parts of the region, the data show small increasing precipitation trends (10 to 20 mm per decade), again, most of which are not statistically significant (Figure 1b). Punta Arenas shows a non-significant increasing precipitation trend from 1960 to 2016 [49], but precipitation has decreased over the last five years. There is also widespread glacier mass loss associated with the warming and snow decline along the Andes, including southern Patagonia [52,53]. Future projections indicate further warming, although slower than the global average and the rest of the country. CMIP5 and Cordex simulations project a slight increase in precipitation under a low and high greenhouse gas concentration scenario [54]. Figure 1d shows, for the period 2070–2099, about a 5% precipitation increase compared with the 1976–2005 period, whereas the newer set of climate projections (CMIP6) indicates a slight drying.

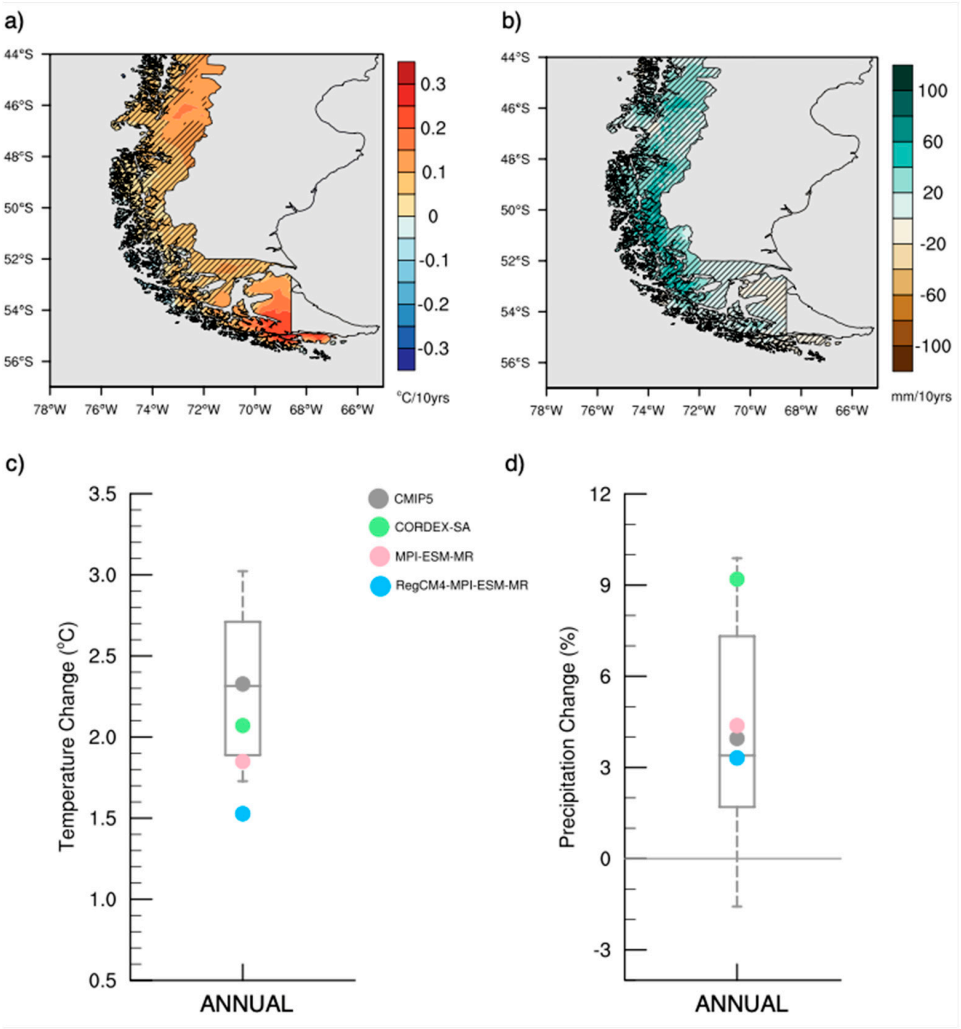


Figure 1. Climate change in Magallanes. (**a**) Spatial distribution of mean annual near-surface temperature trends for the period 1979−2018 (Data source: CR2MET). Regions with non-statistically significant trends at the 95% confidence level based on a two-tailed Student's *t*-test are hatched. (**b**) Same as (**a**) but for annual precipitation. (**c**) Box plot of absolute mean annual near-surface temperature changes for the Magallanes Region for 2070–2099 period (under RCP8.5) with respect to 1976–2005 period. Gray color corresponds to CMIP5 ensemble mean. Green color corresponds to CORDEX-SA (~50 km) ensemble mean. Pink and blue colors correspond to MPI-ESM-MR (~200 km) and RegCM4-MPI-ESM-MR (~10 km), respectively. The CMIP5 ensemble median is represented by the bar across the box and the box-plot whiskers represent the maximum and minimum values of the individual CMIP5 models. The box represents the 25th and 75th percentiles of the individual CMIP5 models. (**d**) Same as (**c**) but for relative changes of annual precipitation.

When analyzing the direct greenhouse gas emissions (GHG) and removals of Chile by region, Magallanes is within the group of carbon-negative regions due to the absorption influenced by the land-use, land-use change, and forestry (LULUCF) sector (Figure 2). In 2018, this region emitted 3332 kt CO_2 eq, representing 3.0% of the national total. Stationary energy was the main emitting sector (14%), which considers the burning of fuel for power generation for industries and commercial, public, and residential buildings. On the other hand, the LULUCF sector absorbed –10,752 kt CO_2 eq in 2018, representing 16.6% of the sector at the national level, mainly produced by the native forest [55]. Although its GHG emissions are very low, its level of emissions per capita is among the highest in the country, which is mainly associated with an inefficient use of heating systems despite the larger need for energy due to the climatic conditions [56].

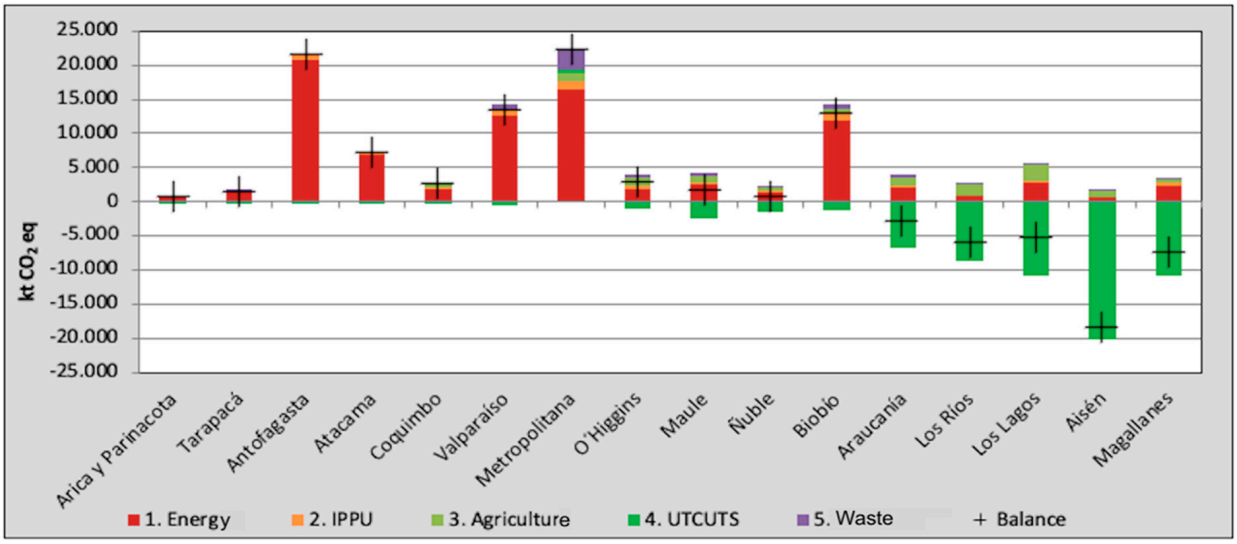


Figure 2. Magallanes: GHG emissions and removals (kt CO_2 eq) by sector, 1990–2018. *IPPU: Industrial processes (not fuel combustion) and product use (mainly refrigerants). *UTCUTS: Land use, land use change, and forestry. Source: MMA Technical Coordinator Team, 2020.

Some studies [3,4,57] have shown that in this region, the regional identity is stronger than in any other part of Chile. The most salient component of this identity is the way of inhabiting this territory, influenced by extreme climatic conditions and unique ecosystems that have shaped the local culture, forming a regional ecological identity [4,57]. Thus, for those born here or who have lived in this territory for a long time, climate change might challenge not only their traditional way of living but also the definition of who they are. For example, a less intense and shorter snow season already has multiple impacts on people´s lives, such as the opportunity of spending more time outside of their homes than they used to in the past. This also illustrates another important aspect of the problem, the possibility of perceiving positive impacts associated with climate change due to more favorable climatic conditions. However, these changes could also trigger negative emotional responses associated with grief or anxiety [58,59].

All in all, it is still unclear whether this regional ecological identity is translated into a greater sense of responsibility for protecting the local natural environment, or a more active role in dealing with climate change. In recent years, different calls for building a more sustainable city or a science-based urban development have emerged from other sectors to respond to these environmental challenges. On the contrary, the salmon industry is pushing for its expansion, and massive renewable energy initiatives related to wind and green hydrogen are being considered to steer the region's development, with multiple social and environmental uncertainties about the benefits and risks these activities could have. As a result, many environmental organizations have been formed, especially in the last decade, to oppose mining- and energy-related projects and infrastructure developments, among others, that could have severe environmental impacts.

Dealing with this conundrum will demand stronger community participation to coordinate multiple stakeholders with different values towards a common goal aimed at the protection of all these areas, safekeeping the relevant ecosystem services that are provided on local, national, and global scales, and the wellbeing of the inhabitants of this region. Thus, knowing the importance of the environment for the local identity, the projected climate change scenarios, the proliferation of environmental organizations, the economic pressures, and a constitutional transition towards more participatory and decentralized institutions, how do people in Punta Arenas perceive these challenges and their role in them?

2. Materials and Methods

2.1. Procedure

The questionnaire design was informed by qualitative data obtained from 3 focus groups. These were realized in a previous investigation stage. We invited members of different local organizations and institutions with vast experience, knowledge, and interest in environmental issues to collaborate in the identification of the main gaps in knowledge related to climate change and community participation that could be addressed in this study. The idea was to gather data deemed important and useful for both the community and our research goals. We organized three online focus groups (September 2020) with 18 local social actors from NGOs, community organizations, academic institutions, and the public sector. They were invited due to their participation in initiatives related to climate change or environmental problems. These focus groups were developed using the platform Zoom and lasted 60–90 min each. Discussions were opened with the following question: As local leaders or representing key stakeholders, what information do you need to know about how people in Punta Arenas perceive climate change? (e.g., main climate change impacts, challenges, responses, concerns, key stakeholders, community participation, constitutional issues, rights of nature, roles and responsibilities, duties).

The analysis of these focus groups allowed us to identify relevant questions for the design of the questionnaire and response alternatives. It also helped us identify the different narratives about the impacts of climate change in Punta Arenas and the population's knowledge about its governance. From this, we designed an instrument organized in three dimensions: (a) how do the inhabitants of Punta Arenas perceive the consequences climate change could have on the future of the city; (b) what are the roles and responsibilities attributed to institutions, organizations, and the community in addressing climate challenges, and (c) what are the general environmental expectations for the future of Punta Arenas?

Together with the design of the questionnaire, the results of the focus groups made it possible to define the research questions that guided the quantitative stage of the study, the results of which are presented in this article. These questions are:

(a) Considering some future climate scenarios, do people in Punta Arenas perceive opportunities or potential positive impacts of climate change, or just negative impacts, as in the rest of the country?
(b) Despite the carbon-negative condition of the region and the limited historic room for community participation in policymaking, do people still perceive themselves as highly responsible for dealing with climate change? What should their roles be?
(c) As the renewable energy industry is expected to grow in the coming years in the Region, mainly green hydrogen and wind energy, what are the main factors to consider when making a decision that could have various benefits but also negatively affect the regional environment?
(d) Considering the importance of the natural environment for the Region's inhabitants, what are the principal rights and duties related to the environment that should be included in the new constitution?
(e) Finally, to what extent does living in this city for a longer time influence these perceptions?

As noted, we worked with a mixed methodology and in successive stages. The results of the qualitative stage were the basis for the design of the quantitative stage. Starting from a qualitative stage favored a pertinent questionnaire design. This was adjusted to the language skills, priorities, and knowledge of the population under study. On the other hand, this methodological strategy allowed us to integrate the emerging interests and concerns of people around these issues, including the constitutional debates that were taking place in parallel with this research.

2.2. Variables and Measures

Categorical variables were used to measure perceptions, evaluations, and subjective positions on these issues. Likewise, independent variables such as age, sex, and the number

of years lived in Punta Arenas were included in the analysis. We combine multiple-choice questions with single-choice questions. The results of the qualitative phase support these design decisions. The items were built using a language and concepts clearly understood during the workshops and were organized into three main dimensions (Table 1).

Table 1. Dimensions and items.

Dimension	Variables	Items
Perceptions of climate change impacts	• Climate change impacts • Possible positive impacts of climate change at the local level • Climate change preparation	• In your opinion, what aspects of your life could be most affected by the impacts of climate change? Multiple choice, up to 3 alternatives. • In your opinion, could climate change have positive local impacts in the Magallanes Region? Multiple choice, up to 3 alternatives. • To face climate change, do you think Punta Arenas is: not at all prepared, little prepared, moderately prepared, fairly prepared, very prepared. Single choice.
Responsibility and roles	• Personal responsibility in solving environmental problems • Personal responsibility for the environment of future generations and duties of the state related to the environment • Duties of citizens related to the environment	• How responsible do you feel that you, your family, and your friends are for solving the environmental problems that currently affect Punta Arenas? Single choice • How responsible do you feel that you, your family, and your friends are regarding the state of the environment in which your children, grandchildren and/or future generations will live? Single choice • In general, who do you think should assume the greatest responsibilities for protecting the environment in the region? Multiple choice, up to 3 alternatives. • In your opinion, what duties related to the environment should be assumed by the Chilean State? Multiple choice, up to 3 alternatives. • In your opinion, what duties related to the environment should be assumed by citizens? Multiple choice, up to 3 alternatives.
Environmental expectations in Punta Arenas	• Rights related to the environment to be considered in the new constitution • Constitutional protection of Patagonian ecosystems • Main safeguards to consider when making decisions, environmental instruments, organizations, institutions, city priorities	• Currently, the Constitution enshrines "the right to live in a pollution-free environment." What other rights related to the environment do you think should be included in the new Constitution? Multiple choice, up to 3 alternatives. • In your opinion, how important is it that the constitution ensures the protection of Patagonian ecosystems and the services that they provide to human beings? Single choice • Do you know and/or have you heard about any of the following instruments, organizations, or institutions related to the environment? multiple choice • Of the following options, which do you think Punta Arenas should prioritize? To be a model of a sustainable city that cares for its environment; to be a capital for international scientific development; to be a world leader in sustainable tourism; to be an example for the world of a city that is resilient to climate change. Single choice

2.3. Participants

The data were gathered using a local survey applied to 1.117 people over 18 years old in Punta Arenas city in November 2020, one year after the October 2019 social unrest. The sample is representative of the population at 95% (confidence intervals) and an error margin of +/−2.18%. Furthermore, the sample was calibrated, weighting the responses using census data distribution as a reference frame. It is important to notice that during this research the city was in lockdown due to the pandemic. Therefore, an online survey was deemed the best choice to gather the data. The questionnaire was applied using artificial intelligence to calculate and obtain probabilistic, stratified, and two-stage sampling. In addition, mechanisms to control selection biases related to the intensity of internet use were implemented. The company that conducted the data collection, STATKNOWS, is specialized in this technique. Table 2 shows the characteristics of the interviewees according to the sociodemographic variables used in the analysis.

Table 2. Sociodemographic variables.

Sociodemographic Variables		**%**
Sex	Woman	50%
	Man	50%
Age groups	18–29	24.2%
	30–39	19.3%
	40–49	17.2%
	50–59	17.6%
	60–69	11.9%
	70+	9.9%
Years living in Punta Arenas	Less than 5 years	9.6%
	From 5 to 10 years	17.9%
	More than 10 and up to 15 years	33.9%
	More than 15 years	38.6%

2.4. Analysis Technique

The analysis focused on presenting the significant associations between variables. To describe these relationships, we used cross tables locating the independent variables in the columns. We consider sex, age group, and years living in Punta Arenas as independent variables. We chose these variables because of the interesting results that their associations provide using the Chi^2 statistic and Cramer's V test. These statistics are appropriate to the metric of variables that we use. For discontinuous categorical variables such as those in this study, Chi^2 is the right statistic to use to establish an association between pairs of variables. Cramer's V, on the other hand, measures the intensity of the association identified by Chi^2 in crosstabs of polytomous variables. We considered as relevant associations only those whose value in the Cramer's V test was equal to or greater than 0.15.

3. Results

3.1. Perceptions of Climate Change Impacts

The results show that climate change is perceived as the main environmental problem affecting the population (29.1%). Most people believe this phenomenon impacts their natural environment, deteriorating it (46%) or limiting access to food (24.8%). In addition, 17.6% of people believe climate change worsens the quality of life in the city. This variable presents slight but significant differences when crossed with age groups (Chi^2: 0.000; Cramer's V: 0.144). More than 50% of people over 60 years old perceive that climate change impacts their environmental surroundings (51.2%). In contrast, less access to food is most frequently perceived among those 18–29 years old (27.4%). It is worth noting that less than 1% of people consider that climate change does not have a negative impact on their lives (Table 3).

Table 3. "In your opinion, what aspects of your life could be most affected by the impacts of climate change?" By "age" and "years living in Punta Arenas".

	Age Groups						Years Living in Punta Arenas				Total
	18–29	**30–39**	**40–49**	**50–59**	**60–69**	**70+**	**Less than 5 Years**	**From 5 to 10 Years**	**More than 10 and up to 15 Years**	**More than 15 Years**	
Deterioration of the natural environment	43.6%	46.2%	44.5%	43.0%	51.2%	50.7%	48.9%	47.7%	46.0%	43.8%	45.8%
Less access to food	27.4%	24.1%	24.5%	24.1%	23.4%	23.4%	21.7%	23.6%	24.5%	26.5%	24.8%
Deteriorating quality of life in the city	16.1%	19.7%	16.4%	20.0%	15.9%	16.6%	17.8%	17.8%	16.3%	18.4%	17.6%
Deterioration of my physical and/or mental health	6.5%	8.0%	8.8%	7.4%	5.6%	5.7%	7.0%	7.0%	7.4%	7.1%	7.2%
Fewer employment opportunities	3.5%	0.7%	4.9%	3.1%	3.7%	2.1%	3.1%	2.2%	4.7%	2.0%	3.0%
Less access to water	1.5%	0.7%	0.8%	1.9%	0.3%	1.5%	0.0%	1.2%	0.7%	1.9%	1.2%
It will not affect me	1.4%	0.7%	0.0%	0.4%	0.0%	0.0%	1.5%	0.6%	0.4%	0.3%	0.5%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Although climate change is generally perceived as a problem, respondents point to a more favorable climate for tourism in the region (41.6%) and more incentives to use renewable energy for heating and transportation (32.7%) as positive effects of climate change. This variable is associated with years of residence in the city (Chi^2: 0.000; Cramer's V: 0.171) and age groups (Chi^2: 0.000; Cramer's V: 0.169). Those who perceive a friendlier climate for tourism are mainly between 18 and 39 years old, who have lived in the city for more than five years. On the other hand, a greater incentive to use renewable energies is a response associated with people 50 years of age or older and people who have lived in Punta Arenas for more than ten years (Table 4).

The identification of potentially positive climate change impacts has not been found in any other study conducted in Chile, and it is certainly quite unusual worldwide. However, the value attributed to the positive effects of climate change does not translate into a positive assessment of the level of preparedness of Punta Arenas for its consequences. Almost 90% of the sample considers that the city is little or not at all prepared to face the consequences of climate change. This variable is also associated with the age group (Chi^2: 0.000; Cramer's V: 0.2010) and the number of years living in the city (Chi^2: 0.000; Cramer's V: 0.149). People between 18 and 49 years of age have a more negative view of the city's preparedness for the effects of climate change, which also occurs among those who have lived in Punta Arenas for less than five years (Table 5).

Table 4. "In your opinion, could climate change have positive local impacts in the Magallanes Region?" By "age" and "years living in Punta Arenas".

	Age Groups						Years Living in Punta Arenas				Total
	18–29	**30–39**	**40–49**	**50–59**	**60–69**	**70+**	**Less than 5 Years**	**From 5 to 10 Years**	**More than 10 and up to 15 Years**	**More than 15 Years**	
Yes, a friendlier climate for tourism in the region	49.4%	45.7%	35.9%	42.0%	34.0%	32.8%	34.0%	44.5%	44.1%	40.5%	41.6%
Yes, more incentives to use renewable energy for heating and transportation	27.7%	26.5%	33.9%	37.7%	38.0%	39.8%	27.3%	28.4%	37.6%	32.1%	32.7%
Yes, greater environmental awareness among the population	11.0%	17.4%	15.6%	9.0%	13.8%	10.0%	21.6%	16.8%	9.6%	11.3%	12.9%
Yes, better climatic conditions for food production	11.9%	10.4%	14.6%	11.2%	14.2%	17.5%	17.0%	10.2%	8.6%	16.0%	12.8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 5. Perceived level of preparation of the city to face climate change by "age" and "years living in Punta Arenas".

To Face Climate Change, Do You Think Punta Arenas is:	Age Groups						Years Living in Punta Arenas				Total
	18–29	**30–39**	**40–49**	**50–59**	**60–69**	**70+**	**Less than 5 Years**	**From 5 to 10 Years**	**More than 10 and up to 15 Years**	**More Than 15 Years**	
Not prepared at all	64.3%	60.1%	59.0%	49.4%	51.8%	48.7%	62.8%	54.3%	54.6%	58.3%	56.9%
Poorly prepared	24.8%	26.5%	33.8%	39.4%	38.1%	46.6%	24.2%	35.9%	37.1%	30.8%	32.9%
Moderately prepared	6.2%	9.8%	4.2%	8.9%	6.1%	2.3%	6.0%	5.6%	6.2%	7.6%	6.6%
Fairly prepared	4.7%	3.0%	1.6%	1.5%	1.9%	0.8%	3.3%	2.9%	1.6%	3.0%	2.6%
Very prepared	0.0%	0.6%	1.6%	0.7%	2.1%	1.5%	3.7%	1.4%	0.4%	0.3%	0.9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

3.2. Responsibilities and Roles

These results contribute to understanding how people perceive not only their level of responsibility in facing environmental issues, but also the specific roles they could play in dealing with them. Responses are heterogeneously distributed regarding the perceived level of individual responsibility for current and future problems associated with climate change. People who consider themselves fully or fairly responsible for current problems account for 54.3%, while 39.1% indicate that they feel somewhat or not at all responsible (Table 6). Regarding the problems for future generations, 51.6% consider themselves fully or fairly responsible, while 43.3% feel somewhat or not at all responsible. Both variables are associated with factors such as sex (Chi^2: 0.000; Cramer's V: 0.157 and Chi^2: 0.000; Cramer's V: 0.220), age (Chi^2: 0.000; Cramer's V: 0.210 and Chi^2: 0.000; Cramer's V: 0.180), and years living in Punta Arenas (Chi^2: 0.000; Cramer's V: 0.257 and Chi^2: 0.000; Cramer's V: 0.204). In this respect, women report higher levels of responsibility, as do people in the

intermediate age groups (30 to 69 years) and those who have lived in the city for more than 10 years (Table 7).

Table 6. "How responsible do you feel that you, your family, and your friends are for solving the environmental problems affecting Punta Arenas?"

Responsibility	%
Fully responsible	19.5%
Fairly responsible	34.8%
Moderately responsible	6.6%
Somewhat responsible	30.8%
Not at all responsible	8.3%
Total	100%

This diversity of opinions on responsibility for climate change impacts is diluted when we ask about responsibility for environmental protection in the region. In this regard, 99.1% of the people attribute this responsibility to public or private institutions; only 0.9% consider that this is the responsibility of citizens. The central government is the institution to which most people delegate the task of environmental protection (61.2%). At the same time, the primary duty attributed to it is promoting the country's sustainable development (52.5%). Other public entities, such as the regional government (19.5%) and the local government (12.5%), are mentioned as responsible for environmental care in smaller percentages. These results are consistent with the duties that respondents attribute to citizens in environmental care actions. Only 25.3% consider that citizens must participate in decision-making that affects the environment, and only 14.6% think that the State must guarantee participation in these processes, whereas demanding compliance with environmental laws is the most frequent duty associated with citizens (43.5%), and only 18% know instruments or institutions related to the environment.

An interesting result of the variables crosses shows how the perception of citizens' duties is related to people's opinions about the role of the Chilean State in caring for the environment. Greater citizen participation in environmental initiatives is associated with a State that guarantees their participation. As shown in Table 8, most of the population that believes the State should guarantee citizen participation in decision-making suggests the community should build a city that respects the environment (50.3%). Those who think that the State should guarantee a healthy environment for future generations consider that people should participate in decision-making processes related to the environment (55.5%). On the contrary, those who think that the state's main role is to dictate regulations that protect nature and ensure its compliance believe that the citizens' principal duties are to consume environmentally friendly products (41.9%) and be informed about the condition of the environment (22%). On the other hand, those who believe that the State should promote sustainable development attribute citizens the role of enforcing environmental laws (70.6%).

Table 7. "How responsible do you feel you, your family and friends are for the State of the environment in which your children will live?" By "sex", "age" and "years living in Punta Arenas".

	Sex		**Age Groups**						**Years Living in Punta Arenas**				**Total**
	Woman	**Man**	**18–29**	**30–39**	**40–49**	**50–59**	**60–69**	**70+**	**Less than 5 Years**	**From 5 to 10 Years**	**More than 10 and up to 15 Years**	**More than 15 Years**	
Fully responsible	16.0%	10.6%	13.0%	14.2%	18.4%	10.5%	14.7%	6.6%	17.3%	7.7%	8.2%	18.7%	13.3%
Fairly responsible	45.6%	30.8%	32.9%	40.4%	33.4%	46.6%	38.7%	40.4%	28.7%	42.5%	41.1%	36.8%	38.3%
Moderately responsible	5.2%	5.1%	8.0%	5.1%	2.5%	3.1%	6.0%	5.2%	6.7%	3.4%	3.9%	6.5%	5.1%
Somewhat responsible	28.1%	40.5%	38.9%	32.6%	37.8%	30.4%	29.4%	32.8%	32.0%	35.7%	36.3%	32.7%	34.3%
Not at all responsible	5.1%	13.0%	7.1%	7.7%	7.9%	9.4%	11.2%	15.0%	15.2%	10.7%	10.4%	5.3%	9.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 8. "What duties related to the environment should the citizenship assume?" By "What duties related to the environment should the State of Chile assume?"

What Duties Related to the Environment Should the Citizenship Assume?	**What Duties Related to the Environment Should the State of Chile Assume?**						
	Establish Regulations That Protect Nature and Guarantee Compliance	**Guarantee the Citizens' Participation in Decision-Making**	**Guarantee A Healthy Environment for Future Generations**	**Encourage Companies to Carry Out Sustainable Projects**	**Promote Sustainable Development of the Country**	**Take Actions to Face Climate Change**	**Do Not Know**
Build an environmentally friendly city	9.7%	50.3%	21.7%	0%	8.9%	36.4%	6.2%
Consume environmentally friendly products	41.9%	15.7%	5.0%	0%	4.0%	31.9%	12.7%
Enforce environmental laws	14.0%	7.6%	17.7%	31.0%	70.6%	11.5%	9.4%
Stay informed about the state of the regional environment	22.0%	2.2%	0.1%	0%	0.3%	13.8%	15.2%
Do not know	5.8%	0.2%	0%	0%	0%	0%	22.5%
Participate in environmental decision-making	6.6%	23.3%	55.5%	0%	16.3%	6.4%	0%
Repair the environment in case of damage	0%	0.7%	0%	69.0%	0%	0%	34.1%
Total	100%	100%	100%	100%	100%	100%	100%

3.3. Environmental Expectations

Despite the outcome of the constitutional referendum, our results show perspectives on issues Chileans are rarely invited to discuss, and that are important in relation to identifying environmental priorities and to an extent the type of relationship they want to have with the natural environment. Regarding environmental expectations, the rights people expect to be included in the new constitution are associated with age groups (Chi^2: 0.000; Cramer's V: 0.190). The right to human water consumption appears as the primary right (44%), especially for people aged 60 or over (53%). On the other hand, the right to a stable climate is an aspiration of 23.6% of people, but it is more frequent among people between 40 and 59 years of age. The rights of animals appear in third place (20.5%) and are more frequently mentioned by young people (18 to 39 years old) (Table 9). Among those who prioritize the human right to water, 75% consider that citizens must demand compliance with this type of mandate. For most of the population, it is important or very important that the constitution ensures the protection of the Patagonian ecosystems and the services they provide to human beings. This variable is associated with the years living in Punta Arenas (Chi^2: 0.000; Cramer's V: 0.255). For people who have lived in the city for more than ten years, it is more important to include this principle in the constitution (Table 10).

Table 9. "Currently, the constitution enshrines 'the right to live in a pollution-free environment'. What other rights related to the environment do you think should be included in the new Constitution?"

	Age Groups						
	18–29	**30–39**	**40–49**	**50–59**	**60–69**	**70+**	**Total**
Human right to water	41.8%	43.7%	41.1%	38.2%	53.0%	54.8%	44.0%
Right to a stable climate	24.2%	20.5%	26.2%	28.0%	18.8%	21.7%	23.6%
Animal rights	22.9%	23.5%	15.4%	21.6%	18.4%	17.7%	20.5%
Right to a healthy atmosphere/clean air	7.2%	9.2%	12.5%	9.1%	7.1%	3.5%	8.5%
Right of future generations to live in a healthy environment	2.5%	2.5%	4.0%	1.9%	0.8%	0.8%	2.3%
Right to participation in environmental issues	0.5%	0.6%	0.8%	0.8%	0.0%	1.5%	0.6%
I don't know	0.9%	0.0%	0.0%	0.4%	1.8%	0.0%	0.5%
Total	100%	100%	100%	100%	100%	100%	100%

Table 10. "In your opinion, how important is it that the constitution ensures the protection of Patagonian ecosystems and the services that they provide to human beings?" By "years of living in Punta Arenas".

	Years Living in Punta Arenas				**Total**
	Less than 5 Years	**From 5 to 10 Years**	**More than 10 and up to 15 Years**	**More than 15 Years**	
Very important	35.9%	37.2%	54.6%	33.7%	41.2%
Important	43.5%	43.7%	32.3%	52.3%	43.5%
More or less important	6.7%	3.4%	3.9%	6.5%	5.1%
Less important	7.2%	11.0%	8.4%	6.6%	8.0%
Nothing important	6.8%	4.6%	0.9%	0.9%	2.2%
Total	100%	100%	100%	100%	100%

Concerning the institutions responsible for caring for the environment, it is relevant to point out that the central government's importance in environmental protection decreases when we ask about the responsibility for environmental problems in Punta Arenas city. In this case, the local government (municipality) appears with the greatest attribution of responsibility on the part of the respondents (46.5%). In second place is the regional government (22.4%), and in third place appears the central government (16.4%). However, most people are unaware of the regulations, organizations, or institutions responsible for the environment in the country. For example, the Regional Climate Change Committee's (CORECC) is known by 0.9% of respondents. A similar situation occurs with the Civil Society Organization for Climate Action (SCAC), established in 2019 for COP25, and with the Superintendency of the Environment, responsible for environmental control and sanctions.

Regarding decisions that can affect the environment in the region, the majority think that it is essential that irreversible changes in the environment are not generated (54.5%). On the other hand, many people consider it important to favor the generation of economic and social benefits (42.4%). Finally, the results indicate that people´s expectations about Punta Arenas' future vary. These include becoming: a model of a sustainable city that cares for its environment (47.2%), a capital for international scientific development (31.4%), and a world leader in sustainable tourism (12.9%).

4. Discussion

Despite the perceived importance of the problem, the multiple impacts, and the low level of preparedness, most people in Punta Arenas do not assume a direct and active role in dealing with climate change and other environmental issues affecting their city. Although around half of the population expressed a high perception of responsibility in solving climate change problems and in the state of the environment for future generations, the way people perceive community participation is mostly limited to individual, passive, and reactive responsibilities, or even to the role of responsible consumer; all of which reflects the traditional characteristics of Chilean democracy [60–62]. These results suggest that all the structural changes made to strengthen community participation in Chile might be going faster than the changes in value–belief systems associated with how people participate in the political system, as the vast majority still delegate the main roles to the different levels of government. Moreover, most people did not know of any instruments, institutions, or organizations related to environmental protection. Thus, it is very important to avoid assuming that structural transformations necessarily reflect changes in other domains.

Similarly, although the emergence of new social organizations in Punta Arenas and national networks motivated by environmental concerns does reflect community-based efforts to deal actively with climate change and other issues, this does not necessarily represent a wider cultural change towards a more participatory society. In fact, the lack of knowledge about environmental organizations found in this study shows that there is a lot to do in terms of engaging more people (and not only activists) in these initiatives (this does not question the quality of the work they have undertaken in protecting the environment in the region).

Increasing collaboration and the involvement of civil society do require a transformation in institutional mechanisms to allow participation that is permanent, informed, wide, transparent, and with a clear effect on the decision-making process. In other words, a different path is necessary than the one drawn by the non-resolving and nominal system that has prevailed in Chile [25,60]. However, creating strategies aimed at more profound cultural transformations from a bottom-up perspective will also be necessary to avoid negative transformation trajectories. For instance, having a more democratic constitution but very few people motivated to actively participate in the new democracy could result in new elites assuming the roles of the old ones. This could paradoxically lead to the same legitimacy problems that triggered the political unrest in 2019. Similarly, more participatory environmental institutions might be unsuccessful if local communities do not have the

motivations, values, technical knowledge, and capacities to get involved. In the case of Punta Arenas, this represents an important challenge, as decentralization efforts are putting more pressure on the municipality and the new regional government to deal with the main social issues, including environmental ones.

We assume that our study is inconclusive, and far more research is needed to dig deeper into these results and project positive transformation trajectories, especially in how people perceive community participation in climate action. However, the literature on this topic presents some ideas that resonate with some of our findings. In particular, the significant association between the perception of responsibility for dealing with environmental problems and the years that people have lived in the city (if we consider the latter as a proxy of place attachment). Several studies have shown the influence of this factor on pro-environmental behaviors and attitudes [63–68]. The longer people live in a territory, the more they care about their environment. Additionally, in the case of Punta Arenas, people with more years in the city have experienced dramatic climate changes, making them more aware of the magnitude of the problem. Thus, it is reasonable to consider the potential positive impacts of place attachment when promoting climate action in Punta Arenas as a driver of more profound transformations in community participation.

Another important factor to consider is the perception of the potential positive impacts of climate change identified in this study. Economic opportunities and increased environmental awareness can help frame climate initiatives to foster more significant community engagement in climate action. To do this, it is necessary to focus on solutions and open a wider conversation about the multiple challenges associated with the climate crisis in the region. This is still more important, considering that various studies have shown the limited impact of fear-based communications centered on catastrophic and disempowering climatic scenarios [69,70]. This positive frame could also integrate the idea of Punta Arenas as a model of a sustainable city that cares for its environment and/or as a capital for international scientific development, both ideas with ample support from the population. In any case, this should be an invitation to discuss, analyze and make decisions about the city's future, and not just accept or reject proposals.

Finally, it is essential not only to educate people about their rights and duties, but also to strengthen environmental and civic education in schools, universities, neighborhood committees, and throughout society. Additionally, it is necessary to identify and address the main barriers to community participation, developing capacities, and valuing local knowledge.

5. Conclusions

This study has shown that climate change is a social priority for the inhabitants of Punta Arenas that needs to be addressed at different levels of society. However, these results also show that transformations related to community participation that deeply change the values and thinking of people (cognitive transformation), the institutions and governance (structural transformation), and the interactions and roles of actors (relational transformation) are occurring, but at different paces and in different domains (functional transformation is also needed, although this was not the focus of the study), making climate action and community engagement difficult. How to strengthen, expand and speed up these transformations remains the main challenge for climate action in the city. Despite the outcomes of the constitutional process, there are many possibilities to address these challenges from a community-based perspective. A first step is to dig deeper into these results with local communities in the aspects and transformations domains that need attention. Sharing concrete examples on how to address these challenges could serve as inspiration to be used in Punta Arenas, while bearing in mind that transformation is context dependent. Therefore, they need to be adequate and suit the specific characteristics of this city (a list and detailed description of examples can be found in this Data Base of Transformation Actions) [71].

Additionally, all transformation actions, especially those that are deliberative (planned) actions, are expected to have a positive transformative trajectory. Nevertheless, transformation actions must be constantly evaluated in a highly changing climate and social environment. This will allow the chance to avoid the unexpected negative impacts that transformation could have. It could also allow a learning opportunity to arise from the ongoing initiative, as every transformation process, given its innovative nature, is an invaluable source of knowledge to dealing with high uncertainty and complex problems such as climate change [21].

Future studies might explore the different types of barriers (psychological, social, cultural) that prevent people from more actively engaging in climate action in this context. Similarly, qualitative studies might help to deepen the implications of the roles and responsibilities identified in this study and analyze the potential positive or negative trajectories associated with the ongoing structural transformations occurring in the country.

Note: Few weeks before the publication of this article, the constitutional proposal was rejected by 61,86% of voters. We strongly believe that such result strengthens the importance of the ideas presented in this manuscript and the need of more research on these issues.

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Institutional Review Board Statement: The data collection process followed the guidelines of the European Union and the State of California for online studies. As an ethical procedure, we ensured the anonymity of the interviewees, providing them information about the study's objectives and who carried it out. Additionally, we allowed the interviewees to freely refuse to answer the questionnaire or withdraw at any time.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: More information about this study is available on https://www.cr2.cl/laboratorio-constituyente-patagonia/, accessed on 1 July 2022.

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