Urban Climate Governance, Adaptation, and Human Rights: The Case of the 'Resilient Municipalities of São Paulo' Project (Municípios Paulistas Resilientes)[1][2]

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Abstract: This article analyzes aspects of urban climate governance with a focus on adaptation and the promotion and protection of human rights in Brazilian cities. It argues that the threat to human rights in cities does not arise from climate change itself, but from the lack of adequate political actions, or the failure of these actions, related to mitigating climate change, enhancing adaptive capacity and building resilience among vulnerable social groups. The methodology includes a literature review and a case analysis of the project "Resilient Municipalities of São Paulo". The article concludes that climate governance with multi-level, multi-actor, multi-sectoral, multi-dimensional, and multi-knowledge aspects is essential to ensure the protection of human rights and adapt populations to the challenges of the climate emergency.

Keywords: adaptation, climate emergency, urban areas, climate justice, resilience

1. Introduction

Changes in the Earth's climate and their consequent adverse effects have brought economic, social, cultural and environmental consequences and have direct and indirect negative implications for the effective promotion and protection of human rights and the achievement of the 2030 Agenda for sustainable development, especially in cities, where more than 4 billion people live - more than half of the world's population.[3] The climate emergency negatively impacts a series of human rights, including the right to life, water and sanitation, food, health, housing, self-determination, culture, development and a healthy environment (Human Rights Council, 2019; UN/OHCHR, 2021; IPCC, 2023).

The right to life is a fundamental human right. However, every day, 115 people have lost their lives in the last 50 years due to climate-related disasters (WMO, 2021). These deaths are linked to the effects of extreme weather events in terms of precipitation,

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2. Article submitted on July 10, 2025 and accepted on October 15, 2025.

3. https://ourworldindata.org/urbanization#:~:text=More%20than%204%20billion%20people,world%20%E2%80%93%20live%20in%20urban%20areas, access on 02/07/2025.

temperature, prolonged periods of drought, forest fires, water-borne and vector-borne diseases, malnutrition, air pollution, among others (Vicedo-Cabrera *et al.*, 2021).

The climate crisis threatens the right to water and sanitation, contributing to water crises and shortages (IPCC, 2023). Climate change compromises essential elements for human health, such as clean air, safe drinking water, nutritious food supplies and safe shelter, putting the right to health at risk. Changes in weather and climate are causing an increase in food-, water- and vector-borne diseases, as well as negatively impacting the mental health of populations. These changes are also responsible for premature deaths, increased incidence of cardiovascular and respiratory diseases, food insecurity, malnutrition, allergies and injuries (WMO, 2021; Watts, 2015).

A safe climate is a vital component of the right to a healthy environment and is essential for human life and well-being (UNEP, 2019). These and other rights are threatened by the failure of states to adopt adequate measures to address climate change. States have a human rights obligation to prevent the foreseeable adverse effects of climate change and to ensure that those affected, especially the most vulnerable, have access to the resources necessary to adapt and to live a life of dignity (UN/OHCHR, 2022).

The aim of this article is to analyze how urban climate governance can be strengthened to promote and protect human rights in Brazilian cities, with a focus on adaptation to climate change. It argues that threats to human rights arise not from climate

change itself, but from the absence or failure of effective policy actions to mitigate its effects, enhance adaptive capacity and build resilience among vulnerable social groups. The article explores how multi-level, multi-actor, multi-sectoral, multi-dimensional, and multi-knowledge approaches can improve the formulation of public policies to address these challenges.

The methodology consists of two main approaches: a literature review and a case study. The literature review was conducted to establish a theoretical foundation on urban climate governance, adaptation and human rights, with the aim of identifying the aspects of climate governance that are essential for the promotion and protection of human rights. The review drew upon scientific articles, reports from international organizations, and public policy documents, selected based on their relevance to the themes addressed and their impact on the field of study.

The case study focuses on the analysis of the project 'Resilient Municipalities of São Paulo', used to empirically illustrate the dynamics of climate governance in a specific context, providing elements on the successes and challenges faced in the governance of climate adaptation. In addition to the documentary research on the project, the first author followed meetings and activities developed within the framework of the project between 2020-2022.[4] This integrated methodological approach allows for a comprehensive and in- depth understanding of the topics investigated, offering an analysis that can be extrapolated to the Brazilian context and provides recommendations for strengthening public adaptation policies and promoting human rights in the urban context.

The article begins by analyzing the main aspects of urban climate governance and its relationship with human rights, with an emphasis on adaptation to climate change. It then examines climate actions implemented in Brazilian cities, highlighting strategies aimed at adapting to the effects of climate change. This is followed by a case analysis of the project 'Resilient Municipalities of São Paulo' contextualized through the theoretical concepts previously discussed and situated within the broader landscape of climate actions in Brazil. Finally, the article returns to its initial objectives to present the conclusions of the analysis and provide recommendations for improving public policies.

2. Climate governance and human rights

2.1. Urban climate governance

Urban climate governance refers to the system of political, administrative and social structures and processes that guide and coordinate cities' response to climate change, with a view to mitigating the problem, i.e. reducing greenhouse gas emissions, as well as adapting to ongoing and future effects. It therefore covers how cities plan, implement and monitor strategies to mitigate the problem, protect populations and promote urban resilience (Van der

4. Webinar Experience of the Santos ProAdapta Adaptation Plan GIZ/SIMA (07/10/2020); Webinar Institutional Arrangements for Municipal Climate Governance (12/11/2020); First Meeting with Interlocutors of Resilient Municipalities of São Paulo (13/05/2021); Launch of the Project 'Resilient Municipalities of São Paulo' (02/06/2021); Pocket Training - Inclusive and Non-sexist Language ProAdapta Project (08/09/2021); Presentation of the partial results of the Climate Change Adaptation and Resilience Plans (14/12/21); Final Event Presentation of the Results and Perspectives of the Project 'Resilient Municipalities of São Paulo' (12/12/2022).

Heijden, 2019; Frantzeskaki, 2022; McCarney, 2013).

When addressing a challenge as multifaceted as the climate emergency, responses must reflect this complexity to ensure the protection of human rights. In this context, we highlight five aspects of urban climate governance that are essential to ensure the effective promotion and defense of these rights, which go hand in hand with the nature of the challenge.

Firstly, urban climate governance is a multi-level challenge, i.e. it involves the municipal, regional, state, national and international levels of governance, since the causes and impacts of climate change are not restricted to geographical borders or municipal boundaries (Bulkeley & Betsill, 2013). This means that climate governance needs to involve not only the municipal level, but also the national and sub-national levels, including the state and regional levels. Cities play a central role in the formulation and implementation of climate action, standing at the intersection between local action and climate commitments at national and international level. Each level of governance has distinct jurisdictions over sectors related to climate change.

Although the literature (Bulkeley & Newell, 2023) shows that local governments lead the way in formulating concrete policies and specific actions, many Brazilian municipalities still lack the institutional, technical and financial structure to adequately address the challenge of climate change. In this sense, the state level is crucial for facilitating communication between the federal and municipal levels, supporting local planning and ensuring an integrated approach. Given that climate change disproportionately affects the most vulnerable groups, effective coordination and cooperation between different levels of government is essential for an equitable and efficient response.

Secondly, the climate emergency is a challenge that requires the participation of multiple actors, and therefore multi-agency governance. Although governments play a crucial role in defining norms, institutions and governance strategies to address climate risks at different levels and scales (Bulkeley & Newell, 2023), it is clear that the climate crisis cannot be solved by a single group of actors. Therefore, the involvement and collaboration of various actors, both governmental and non-governmental, is essential. This includes civil society organizations, vulnerable social groups, the private sector, universities, research institutions and cooperation networks, among others. The active and meaningful participation of everyone, especially those historically excluded from decision-making processes, is essential for equitable and effective climate governance.

Thirdly, urban climate governance is intrinsically multi-sectoral, involving a variety of government sectors that are essential to dealing with its challenges. The impacts of climate change permeate various sectors and policy areas, requiring an integrated and coordinated approach between different sectors to ensure the effectiveness of adaptation and resilience measures. For example, climate change mitigation in cities involves key sectors such as urban development, which includes land-use planning strategies; the built environment; urban infrastructure, including energy, water and sanitation systems, and solid waste; transportation; and carbon sequestration, through initiatives such as conservation and reforestation (Bizikova *et al.*, 2010; UN-Habitat, 2024). Adaptation to climate change involves similar sectors, including urban planning and development, the built environment, urban infrastructure and services, as well as others such as the environment, agriculture, health and disaster risk management. Integration among these sectors allows for the development of comprehensive strategies that take into account the interconnections and interdependencies among different areas. For example, adaptation measures in urban planning and infrastructure can reduce vulnerability to floods and heat waves, while actions in the health sector can prepare the system to respond to climate-related disease outbreaks. Disaster risk management benefits from collaboration with infrastructure and environmental sectors, promoting a preventive and responsive approach.

The fourth fundamental aspect of urban climate governance is its multidimensional nature. Climate change is not limited to an isolated environmental problem, but is intertwined with economic, social, cultural and political issues (Giddens, 2009). In urban areas, these changes affect a wide range of challenges, including poverty eradication, sanitation, water and food scarcity, and population growth. In addition, they create new challenges, such as forced migration due to climate change. These impacts are more intense in vulnerable communities, which face additional difficulties in adapting to the changes (Ionesco *et al.*, 2016; Adger *et al.*, 2020).

To deal with these complex impacts, adaptation planning must be closely linked to urban development and the specific conditions of each city. Adaptation strategies must be comprehensive and consider not only the environmental dimension, but also social, economic and cultural issues. In short,

they need to be integrated and inclusive strategies in order to promote the resilience of urban populations and protect their basic rights.

Finally, urban climate governance requires a multi-knowledge approach, combining scientific knowledge with traditional and local knowledge. Climate risks demand a transdisciplinary vision, where climate science is enriched by local and indigenous knowledge, helping to overcome the limitations of modern techno-scientific approaches and advance the search for solutions (Hastrup & Skrydstrup, 2013).

It is crucial to recognize that scientific knowledge is not the only valid resource when formulating climate policies. A polycentric approach seeks to value and integrate a wide range of knowledges, including traditional and indigenous, as well as ecological, experiential and community knowledge, respecting cultural plurality and promoting more inclusive and participatory governance (Hastrup & Skrydstrup, 2013). In order to respond effectively to the challenges of the climate emergency, it is necessary to understand the extent of the climate crisis in the territory and assess the availability and translation of scientific knowledge for local decision-makers. In addition, it is essential to explore how best to produce and incorporate scientific data into local planning and decision-making processes.

2.2. Adaptation to climate change and human rights

The global agenda of adaptation, cities and human rights has been constantly reinforced in the international arena. First, with the Sustainable Development Goals (SDGs), part of the global development agenda approved by the United Nations (UN) in 2015.[5] At the same time, the New Urban Agenda of the United Nations Human Settlements Program (UN-Habitat) in 2016 strongly addresses the role of cities in mitigating and adapting to climate change.[6] This theme is also included in the disaster risk reduction and resilience agenda, disseminated by the Sendai Framework (2015-2030)[7] and the UN Campaign Making Cities Resilient 2030 (MCR2030).[8] And finally, the Paris Agreement, also in 2015, resulting from the Conference of the Parties (COP) 21, seeks to strengthen the capacity of societies to deal with the impacts of climate change and provide ongoing international support for adaptation in developing countries.[9]

It is important to note that the impacts of climate change are not homogeneous. Inequalities related to gender, ethnicity, age, race and economic status result in different levels of vulnerability and adaptive capacity (Adger *et al.*, 2020; Ferreira & Barbi, 2023). It is therefore crucial to identify how these vulnerable groups are affected and to involve their perspectives in all phases of adaptation planning to ensure that their needs are adequately met.

The urgency of improving the living conditions of Black, Quilombola and Indigenous populations, who often reside in at-risk areas in Brazil, highlights the need for an inclusive and anti-racist approach to climate adaptation (Belmont, 2024; Zoll, 2022). For these reasons, the active participation of vulnerable groups in adaptation planning is essential. Their inclusion improves the effectiveness of strategies and ensures that they are developed fairly and appropriately. This approach not only increases the legitimacy of the process, but also strengthens democracy and climate justice by recognizing and addressing existing inequalities and their disproportionate impacts. The climate justice approach recognizes climate change as not only an environmental problem, but an ethical, political and social challenge, with disproportionate impacts on different groups and countries. This perspective seeks to ensure that climate mitigation and adaptation actions are developed and implemented in an equitable and fair manner, taking into account human rights, historical inequalities and differentiated responsibilities (Rammê, 2012).

The following section provides an overview of climate action in Brazilian cities, with a focus on adaptation to the effects of climate change and its implications for human rights.

5. The seventeen SDGs include several targets that align with the scope of adaptation in urban areas for the 2030 horizon, such as those related to clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), industry, innovation, and infrastructure (SDG 9), reducing inequalities (SDG 10), sustainable cities and communities (SDG 11), and, in particular, climate action (SDG 13).

6. https://habitat3.org/the-new-urban-agenda, access on 01/07/2025.

7. https://www.undrr.org/implementing-sendai-framework/what-sendai-framework, access on 01/07/2025.

8. https://mcr2030.undrr.org/, access on 01/07/2025.

9. UNFCCC – United Nations Framework Convention on Climate Change. Adoption of the Paris Agreement. Available at: https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf, access on 01/07/2025.

3. Climate action in brazilian cities

Brazil's regions are heterogeneous, with great social, cultural, ecological and climatic diversity, which influences both individual and collective resilience in the face of climate change. Urban areas were home to 203.1 million people, 87% of the population in 2022.[10] The urbanization process in Brazilian cities has posed significant challenges for urban planning, including the overburdening of infrastructure — particularly sanitation, transportation, and housing systems — and environmental degradation (Ferreira & Viola, 1996). As a consequence of this process, areas deemed unsuitable for occupation have been increasingly settled, exposing primarily low-income populations to risk situations such as landslides and flooding (Ribeiro, 2010). These pre-existing urban vulnerabilities have been further intensified by the impacts of climate change (Perez *et al.*, 2020).

Thus, Brazilian cities face a series of challenges resulting from climate change, ranging from extreme weather events resulting from changes in precipitation such as floods, droughts and landslides, to rising urban temperatures, heat waves, and rising sea levels in coastal cities. These phenomena have significant impacts on public health, urban infrastructure, water, energy and food security and the local economy, directly affecting the quality of life and well- being of urban populations.

In Brazil, adaptation is provided for in the National Policy on Climate Change (Law No. 12.187/09, regulated by Decree No. 7.390/10), promoted through the three spheres of the Federation, with the participation and collaboration of interested economic and social agents or beneficiaries. In order to help the different levels of government access the appropriate methodologies and information for carrying out vulnerability analyses, managing climate risk and drawing up adaptation measures, the federal government developed the National Climate Change Adaptation Plan (PNA) in 2016, an instrument aimed at reducing the country's climate risk and implementing the National Adaptation Agenda.

Since 2024, the PNA has been updated as part of the National Climate Change Plan (Plano Clima), which will guide Brazilian climate policy until 2035 based on mitigation and adaptation axes, each with national strategies and sector-specific plans - eight for mitigation and 15 for adaptation - as well as targets and means of implementation.

Climate action in Brazilian cities takes place in three main phases (Barbi & Rei, 2021). The first takes place until 2011, when the first climate policies were approved by Brazilian cities, with a focus on mitigating GHG emissions: Palmas-TO (2003), Porto Alegre-RS (2007), Curitiba- PR (2009), São Paulo-SP (2009), Manaus-AM (2010), Belo Horizonte-MG (2011), Feira de Santana-BA (2011), Rio de Janeiro-RJ (2011) and Florianópolis (2015). During this period, the international political agenda turned to the climate issue, with the publication of the IPCC Assessment Report (2007) and the mobilization of international public opinion. The culmination of the discussions was the 15th Conference of the Parties (COP) to the UN Climate Convention, held in Copenhagen in 2009. In Brazil, discussions on the basis of climate policy had been taking place since 2000, within the framework of the Brazilian Climate Change Forum (FBMC), culminating in the approval of the National Climate Change Policy (Law No. 12.187/09) in 2009, two weeks after the end of the 15th COP.

Between 2011 and 2013, the climate issue lost prominence on the international political agenda, due to the effects of the international financial crisis and the difficulties of making progress in the negotiations for a new period of post-Kyoto commitments. This is reflected in the fact that no climate policy was approved in Brazil at municipal level.

From 2016 onwards, the second phase of climate action in Brazilian cities began, marked by a greater focus on adaptation to the effects of climate change and building resilience, given the worsening of climate change with the increase in the frequency and intensity of extreme weather events and the global failure to contain GHG emissions. In the international arena, the issue once again gained political attention when the IPCC released its 5th Assessment Report (2014) and the following year, the Paris Agreement was finally signed at COP 21. In Brazil, finally, the National Adaptation Plan was published in 2016.

Not all Brazilian cities with climate policies have a specific adaptation plan or strategy. The cities that published their adaptation plans during this period were: Santos-SP and Sorocaba-SP (2016) and Extrema-MG (2018).

Since 2020, the local adaptation agenda has been significantly strengthened in Brazil with the drafting of plans that address human rights and climate justice issues, including gender issues. This progress

10. https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/41901-censo-2022-87-da-populacao-brasileira-vive-em-areas-urbanas#:~:text=Segundo%20o%20Censo%20Demogr%C3%A1fico%202022,%25)%20estavam%20em%20%C3%A1reas%20rurais, access on 02/07/2025.

has been supported by international technical cooperation and facilitated by transnational municipal networks such as ICLEI – Local Governments for Sustainability and C40 Cities. These efforts have led to the publication of adaptation plans for the cities of Belo Horizonte, Curitiba, Fortaleza, João Pessoa, Porto Alegre, Recife, Rio de Janeiro, Salvador and São Paulo. Human rights and climate justice considerations are also present in the adaptation and resilience plans of ten municipalities in the state of São Paulo: Americana, Francisco Morato, Gabriel Monteiro, Guarulhos, Jales, Rosana, São José do Rio Preto, Ubatuba, Registro and Iguape, published in 2022 as part of the "Resilient Municipalities of São Paulo" project, also developed through international technical cooperation. This initiative will be further analyzed in the following section. Table 1 presents a summary of the three phases of climate action in Brazilian cities.

TABLE1 • CLIMATE ACTION IN BRAZILIAN CITIES

PHASE	PERIOD	CLIMATE ACTION	CITIES
Phase 1	Until 2015	• Approval of the first climate policies by Brazilian cities, with a greater focus on mitigating GHG emissions, influenced by the international agenda; • 09 municipal policies approved.	• Palmas-TO (2003), • Porto Alegre-RS (2007), • Curitiba-PR (2009), • São Paulo-SP (2009), • Manaus-AM (2010), • Belo Horizonte-MG (2011), • Feira de Santana-BA (2011), • Rio de Janeiro-RJ (2011), • Florianópolis (2015).
Phase 2	2016-2020	• Recognition of unavoidable impacts and need for adaptation; • 03 adaptation plans published.	• Santos-SP (2016), • Sorocaba-SP (2016), • Extrema-MG (2018).
Phase 3	From 2020	• Integration of new ethical and social dimensions into climate governance; • Adaptation and resilience plans addressing human rights and climate justice issues, including gender issues; • 22 adaptation plans published.	• Fortaleza-CE (2020), • Recife-PE (2020), • Curitiba-PR (2020), • São Paulo-SP (2020), • Salvador-BA (2020), • Rio Branco-AC (2020), • Rio de Janeiro-RJ (2021), • Santos-SP (revised in 2022), • Americana-SP (2022), • Francisco Morato-SP (2022), • Gabriel Monteiro-SP (2022), • Guarulhos-SP (2022), • Jales-SP (2022), • Rosana-SP (2022), • São José do Rio Preto-SP (2022), • Ubatuba-SP (2022), • Iguape (2022), • Registro (2022), • Belo Horizonte-MG (2022), • João Pessoa-PB (2023), • Teresina-PI (2023), • Porto Alegre-RS (2024).

Source: Elaborated by the first author.

Brazil faces significant challenges when it comes to climate change, especially in the context of cities. By 2024, only 22 Brazilian municipalities out of 5,570 had any adaptation planning in place. In addition, coastal cities represent a major gap in municipal climate policies in Brazil, whose coastline stretches for more than 8,000 km, where many and some of the country's most important cities are located, concentrating most of the population. They are considered even more vulnerable to climate change due to their geographical specificity, their interface between continent, atmosphere and ocean, and because they are places with a high concentration of people and structures, these events often turn into disasters, since people and structures can be severely affected (IWAMA, 2014). Only 08 coastal municipalities have adaptation plans in the country.

The existence of a plan does not guarantee success in responding to the effects of climate change; effective implementation of its proposals is essential. The importance of the plan lies in its capacity to chart a pathway for preparing the city for climate change, based on its specific context and needs. It is crucial that the plan sets out concrete goals, guidelines and actions for adaptation and climate justice, with a focus on equity and the well-being of the population. Moreover, it should prioritize addressing the needs and demands of the most vulnerable social groups.

In this context, it is important to align local climate actions with international commitments, such as the Paris Agreement, which establishes ambitious targets for reducing climate impacts. Effective and sustainable responses to this global crisis require collaboration between local governments, civil society, and the private sector. The following case study offers a deeper analysis of this issue.

4. The Project 'Resilient Municipalities of São Paulo'

as it represents a pioneering and innovative initiative that addresses climate adaptation in a Brazilian state characterized by significant climatic and socio-economic diversity. Moreover, the project exemplifies multifaceted climate governance, aligning with the article's central argument on the need for integrated and inclusive approaches. Its documented results and impacts provide a robust empirical basis for analysis, while its emphasis on climate justice and the protection of human rights reinforces the core principles of this study. Finally, the project offers valuable lessons in scalable and replicable practices, contributing to the development of effective guidelines for municipal policymakers throughout Brazil.

4.1. Background of the project 'Resilient Municipalities of São Paulo'

The project 'Resilient Municipalities of São Paulo' (RMSP) has emerged as a key initiative aligned with São Paulo's 2009 State Climate Change Policy (PEMC), with the aim of increasing the state's resilience to the impacts of climate change. This project is part of a set of state programs and projects aimed at climate adaptation, including the Blue Green Municipality Program (SMA Resolution No. 33/2018), São Paulo's Ecological-Economic Zoning (Decree No. 64.526/2019), the State Program for Natural Disaster Prevention and Risk Reduction (State Decree No. 64.673/2019), the Water Springs Program and the Resilient Municipality Program, established by Decree No. 64.659/2019, with the aim of encouraging São Paulo municipalities to adopt disaster risk reduction policies.

However, even with these actions, the Environmental Quality Report for the State of São Paulo (2019) revealed the magnitude of the challenges faced, with 21,322 extreme events recorded between 2000 and 2017, affecting 544 municipalities and resulting in around 1,000 deaths and thousands of people affected. In view of this scenario, the state government set up the RMSP project with the aim of encouraging the state's municipalities to organize and use data and information, collected in state projects and plans, as a tool for planning local measures to adapt to climate change, through municipal and regional plans.

To achieve these goals, the state signed a Technical Cooperation Agreement with the German Cooperation Agency - GIZ in August 2020, which brought expertise in ecosystem-based adaptation (AbE) to support capacity building in municipalities.[11] Through this cooperation, a Pilot Subprogram of the RMSP Project was created (2020-2022), which included a capacity building and training program with public agents to pass on knowledge to 10 mu-

11. This cooperation took place under the ProAdapta project, which began in 2017 with the aim of supporting the Brazilian government in implementing the national agenda for adaptation to climate change, including different levels of government, the private sector and civil society. The initiative is the result of a partnership between the Brazilian Ministry of the Environment (MMA) and the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), in the context of the International Climate Initiative (IKI) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (https://www.adaptacao.eco.br/sobre-o-proadapta/, access on 02/07/2025).

nicipalities - Gabriel Monteiro, Ubatuba, Americana, Francisco Morato, Guarulhos, Jales, Iguape, Registro, São José do Rio Preto, Rosana - and the Metropolitan Region of Baixada Santista.

The selection of the pilot municipalities was based on the concepts of the UN's "Building Resilient Cities" Program, which presents 10 steps that municipalities should follow to improve their capacity for adaptation and resilience. Of these, eight were selected to make up the Resilience Capacity Index for the selection of pilot municipalities: governance, financial resources, risk assessments, territorial planning and critical infrastructure, schools and health centers, education and perception, ecosystem services and natural resources, and alert and response. For these 8 steps, 31 indicators were used, applying data extracted from official databases, mainly from the Blue Green Municipality Program and the Ecological and Economic Zoning of the State of São Paulo (ZEE/SP). In the end, the municipalities were classified into five classes: very low resilience; low resilience; moderate resilience; high resilience; and very high resilience. The municipalities selected for the pilot were those with low/very low and high/very high resilience scores, distributed across the state's seven hydrographic regions.[12]

The project was coordinated by SEMIL's (Secretariat for the Environment, Infrastructure and Logistics) Office for Climate Change and Sustainability, the Undersecretariat for the Environment, the Institute for Environmental Research (IPA) and the State Civil Defense, with the aim of promoting an integrated and effective approach to climate resilience.

At the end of the pilot phase, 10 municipal adaptation plans were published, along with technical inputs for the regional plan of the Metropolitan Region of Baixada Santista. In the following section, we analyze the project through the lens of the five key aspects of urban climate governance outlined above.

4.2. The Project 'Resilient Municipalities of São Paulo' in the Light of Urban Climate Governance

4.2.1. Multi-level urban climate governance

The multi-level dimension of the "Resilient Municipalities of São Paulo" project is primarily expressed through the interaction between state, regional, and municipal levels of governance. As a state-led initiative, the project aims to support both municipal and regional efforts in planning climate adaptation actions. In the Brazilian context, regional adaptation plans remain scarce, representing a significant gap. Regional-level planning is essential to ensure coordination and coherence across municipalities, optimize the use of resources, and promote an integrated approach to addressing climate impacts. It also strengthens institutional capacity, facilitates the inclusion of diverse voices and needs, and enables more effective monitoring and evaluation. Moreover, it supports integrated management and coordinated disaster response across jurisdictions.

Another multi-level dimension of the project lies in recognizing the disparities between the state's municipalities, seeking to provide differentiated support, ensuring that the smallest and most vulnerable municipalities are included in climate governance. The 645 municipalities in the state of São Paulo present a vast diversity in terms of size, population, level of urbanization, socio-economic development and environmental characteristics. From large metropolises like São Paulo and Campinas, which face complex challenges of infrastructure, pollution and population density, to small towns dealing with issues of access to resources and specific vulnerabilities to the climate, each municipality has its own particularities. This heterogeneity is reflected in climate governance, as adaptation strategies need to be adapted to local contexts.

In institutional terms, large cities have more robust governance structures, with specific secretariats for environmental and climate issues, while smaller municipalities may face institutional and administrative limitations. In terms of resources, there is also a disparity: metropolises have more access to funding and investments, both public and private, to implement adaptation measures, while small municipalities often depend on state or federal resources, which can be scarce or insufficient. Technical capacity also varies. Larger cities can attract and retain qualified professionals and have greater access to advanced technologies, while smaller municipalities often face challenges in training their technical staff and adopting new technologies. Access to climate data and information is another point of divergence: larger urban centers generally have better infrastructure for data collection and analysis, as well as partnerships with universities and research institutions, while smaller municipalities may have difficulty accessing accurate and up-to-date information.

12. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2023/02/estudo-resiliencia_vfinal2.pdf, access on 02/07/2025.

This diversity calls for a multifaceted approach that allows for the implementation of flexible and inclusive policies, ensuring that all municipalities, regardless of their characteristics, can develop greater adaptive capacity in the face of the climate emergency.

4.2.2. Multi-actor urban climate governance

The multi-actor dimension of the project brought together a diversity of agents who collaborated in the process of building climate adaptation strategies. The state government played a central role in coordinating and providing general guidelines, through the Technical Group made up of SEMIL's Climate Change and Sustainability Office, the Environment Undersecretariat, the Environmental Research Institute (IPA) and the State Civil Defense. At the same time, the municipal governments, which are responsible for developing local adaptation strategies, involved other local agents in their preparation, such as educational and research institutions and organized civil society groups, which happened in five participating municipalities. The highlight is the Working Group created by the municipality of Guarulhos, which included 17 representatives from public authorities, 4 from educational and research institutions, and 9 from organized civil society. Notably, 50% of the WG's representatives were women. Also taking part in the project were the DAEE (Department of Water and Electricity), together with the CBH-BS (Baixada Santista Hydrographic Basin Committee), subsidizing and providing information about the metropolitan region's water resources, as well as CETESB (São Paulo State Environmental Company), providing data and trained people to contribute to the plan.

In addition to the government agents, the project had the participation of specialized consultancies, research institutes and non-profit civil associations that contributed with technical and scientific knowledge, offering data and analysis to support political decisions and adaptation strategies, such as the document "Evaluation of data and climate modeling for the Baixada Santista metropolitan region",[13] providing climate analysis for the region considering observed data and future climate modeling. Among the institutions involved, Imaflora (Institute for Forest and Agricultural Management and Certification) provided training and advisory support to both municipalities and the region; GE21 Geotecnologias enabled the use of georeferenced data through the Virtual Analysis Environment (AVA); and UNESP (São Paulo State University) contributed with its trained academic staff.

The multi-agent aspect of the project includes a partnership with the project "Support for Brazil in Implementing its National Agenda for Adaptation to Climate Change" (ProAdapta), the result of an agreement between the Brazilian Ministry of the Environment (MMA) and the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), in the context of the International Climate Initiative and implemented by the technical cooperation agency Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ).

GIZ's participation added a global dimension to the project, bringing experiences and successful practices from other parts of the world, as well as offering technical and financial support. The thematic axes of the support were: territorial planning with adaptation to climate change and ecosystem-based adaptation (EbA); classification of municipal adaptation capacity and planning; organization of data and information in the state's EEZ (Ecological- Economic Zoning) Network; definition of the scope of adaptation plans and development of a prototype tool for integrating geoinformation.[14] The work of mobilization and engagement throughout the development of the project stands out, which provided the people representing each city/region with the conditions to draw up adaptation plans, especially during a period when working conditions were remote due to the COVID-19 pandemic, further demanding the need for connectivity.[15]

The climate governance capacity factors (legal competence, funding, human and technical resources) of São Paulo's local governments were significantly strengthened by their participation in the project. In cases where any of these factors do not exist to a significant degree, it is likely that local governments will not be able to implement climate change policies (Ryan, 2015). In the case of the São Paulo municipalities participating in the project, this was made possible through the various functions performed mainly by international cooperation,

13. https://smastr16.blob.core.windows.net/home/2022/02/relatorio-final-baixada-santista-out_2021_completo-23.02.pdf, access on 02/07/2025.

14. https://smastr16.blob.core.windows.net/smaglobal/sites/230/2021/05/convenio-sima-giz-assinado.pdf, https://smastr16.blob.core.windows.net/smaglobal/sites/230/2021/05/apresentacao-municipios-paulistas-resilientes-final-nalon.pdf, access on 02/07/2025.

15. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2023/01/cartilha-de-engajamento-e-mobilizacao.pdf, access on 02/07/2025.

through the partnership with the ProAdapta Project, such as: information sharing, capacity building, platform construction, consultancy, direct action and implementation, definition of objectives and rules and articulation.

This multi-agency approach included workshops for exchanging experiences and lessons learned between municipalities and the state, as well as a two-year training program for the pilot municipalities. The process was supported by the *Guide to Drawing Up Climate Adaptation and Resilience Plans*, which provided methodological guidance throughout the development of local plans.[16]

4.2.3. Multi-sectoral urban climate governance

With regard to the multi-sectoral dimension of climate governance, the project showed the importance of involving various government sectors that are essential for planning climate adaptation, in addition to the environment and civil defense sector, which are usually more aligned with the issue, with emphasis on the urban planning and development sector, as well as others such as: infrastructure and services, health, housing, coastal management, agriculture and tourism, depending on the profile of the municipality (UN-Habitat, 2024). Although many climate plans in Brazilian cities recognize the need for a multi-sectoral approach to adaptation, in practice, implementation is usually carried out predominantly by the environment and civil defense sectors (Barbi & Rei, 2021). Leadership from the urban planning sector, which is crucial for effective adaptation planning, is often lacking. Of the 10 plans published under the RMSP project, 6 of them involved several secretariats, thus involving different sectors of government.

This multi-sectoral approach also facilitates the efficient allocation of resources, the sharing of information, and the implementation of more cohesive and effective policies. In the RMSP project, coordination among different sectors ensures that actions are complementary and synergistic, maximizing benefits and minimizing costs by aligning proposed adaptation measures with existing local plans and initiatives, thereby facilitating their implementation. Moreover, the involvement of multiple sectors fosters more inclusive governance, ensuring that diverse perspectives and needs are incorporated into the climate adaptation process.

4.2.4. Multi-dimensional urban climate governance

The multi-dimensional aspect of climate governance appears in the project by addressing the complex interactions among the climate emergency and economic, social, cultural and political issues. Tools were presented for including human rights issues, including gender, in adaptation planning through the Guide and the distance learning course for municipal representatives.

The gender issue was widely highlighted in the project because it is a fundamental technical issue for reducing inequalities that increase vulnerability in the face of the climate emergency, as well as harnessing various potentials for effective adaptation. The project team tried to internalize the gender issue, but encountered difficulties due to misinformation and confusion about the subject.[17] It tried to overcome these difficulties by setting up a Gender Working Group and holding webinars and workshops on the subject, such as "Gender, public policies and adaptation", presenting the "Pira no Clima" project, which seeks to build a Participatory Municipal Plan for Mitigation and Adaptation to Climate Change in the municipality of Piracicaba[18] and training on inclusive and non-sexist language in public policies.[19]

All the plans published under the project addressed the human rights perspective, including gender in some way, proposing adaptation strategies that can be divided into three main aspects: capacity building, political-social incentive actions and actions aimed at specific social groups, as shown in Table 2.

16. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2023/06/guia_-pmpr_2a-edicao_2023.pdf, access on 02/07/2025.

17. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2023/03/12.2022_relatorio-reflexao-genero-pmpr.pdf, https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2023/03/12.2022_evento-pmpr_genero-vs-final.pdf access on 02/07/2025.

18. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2021/06/painel-sintesevisual-webinar-ge%CC%82nerosima-giz.pdf, access on 02/07/2025.

19. https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2021/06/painel-linguagem_politica-002.pdf; https://smastr16.blob.core.windows.net/municipiosresilientes/sites/257/2021/06/convite-oficina-lins-simagiz-curto-link.pdf, access on 02/07/2025.

TABLE 2 • HUMAN RIGHTS IN THE ADAPTATION PLANS OF THE PROJECT 'RESILIENT MUNICIPALITIES SÃO PAULO'

HUMAN RIGHTS PERSPECTIVE IN THE ADAPTATION PLANS OF THE PROJECT		
CAPACITY BUILDING	**POLITICAL AND SOCIAL INCENTIVE ACTIONS**	**ACTIONS AIMED AT SPECIFIC SOCIAL GROUPS**
• Capacity building, training, education; • Themes: sustainable management of natural resources, agricultural techniques, climate change and its impacts, adaptation and resilience; • Target audience: Farmers, women and young people, public • managers.	• Economic development (family farming).	• Homeless people; • Lower-income population.

Source: Elaborated by the first author.

4.2.5. Multi-knowledge urban climate governance

The multi-knowledge dimension of climate governance was addressed in the project through the Guide and the distance learning course for people representing the pilot municipalities. In this material, the guideline is that in the analyses and decisions during adaptation planning, an attempt should be made to consider different types of knowledge, produced not only by technical or academic specialists, for example. The guideline is to try to integrate into the plan: (i) scientific and technical knowledge, such as official data, reports from social organizations, studies carried out not only by men, but also by women and minority groups, and observations by the public administration's technical teams; (ii) traditional knowledge, such as that related to community management of natural resources, women's sowing practices, for example; and (iii) citizen knowledge, which takes into account the experience of different people in relation to infrastructure and services, for example, in terms of public spaces and roads, public health care, etc.

The project has largely used technical-scientific knowledge to support the participating municipalities in planning actions, indicating data sources and methodologies that can be used for risk analysis for the territory, including aspects of vulnerability and climate projections. Table 3 summarizes the main aspects of urban climate governance in the project.

TABLE 3 • ASPECTS OF URBAN CLIMATE GOVERNANCE IN THE PROJECT 'RESILIENT MUNICIPALITIES OF SÃO PAULO'

ASPECT OF URBAN CLIMATE GOVERNANCE	DESCRIPTION
Multi-level	• Involvement of state, regional and municipal levels. • State-level initiative to support adaptation actions at lower levels. • Filling the regional planning gap to promote integrated management of responses to climate challenges.
Multi-agent	• Diversity of agents involved in building adaptation strategies, including state and municipal governments, educational institutions and civil society. • Highlight goes to the partnership with the ProAdapta project, which provided technical support and supported the mobilization and engagement of RMSP participants.
Multi-sectoral	• Involvement of various government sectors, in addition to the environment and civil defense, such as urban planning, health, infrastructure and agriculture. • Six of the project's ten climate plans involved several secretariats, which can facilitate the efficient allocation of resources and integrated policies.
Multi-dimensional	• Addressing the interactions between the climate emergency and economic, social, cultural and political issues. • Integration of human rights and gender in planning, with the creation of working groups and workshops on inclusion.
Multi-knowledge	• Project guidelines emphasize the importance of considering knowledge from diverse groups, ensuring equity and inclusion in governance processes. • The guidelines also seek to value different types of knowledge: scientific, traditional and citizen. • Predominance of technical-scientific knowledge in the RMSP project.

Source: Elaborated by the first author.

Among the main guidelines of the project are: the human rights perspective, equity and participation in the governance processes of adaptation planning. In short, the project exemplified the importance of multifaceted climate governance, in which collaboration and cooperation between different levels of governance, agents, sectors, dimensions and knowledge is fundamental to responding to the challenges brought about by the climate emergency.

5. Conclusion

This article has analyzed the main dimensions of urban climate governance as essential elements for promoting and protecting human rights in Brazilian cities, with an emphasis on adaptation to climate change, since threats to human rights do not originate solely from climate change, but mainly from the lack of effective political actions that mitigate its impacts and increase the adaptive capacity of vulnerable social groups.

In conclusion, the analysis of the project "Resilient Municipalities of São Paulo" has shown that by adopting a multi-level, multi-agent, multi-sectoral, multi-dimensional and multi-knowledge perspective of urban climate governance, public policies can make a more significant contribution to the promotion and protection of human rights in Brazilian cities. Climate change represents a challenge that transcends borders and affects both global and local scales, making it a multi-level problem. This requires vertical networks that integrate agents from the local, national and international levels, as well as horizontal networks at the local level, with the collaboration of various sectors and agents, each playing specific roles. Furthermore, climate issues are not isolated; they are interlinked with economic, social, cultural and political factors. This understanding is fundamental to developing policies that not only mitigate the impacts of climate change, but also promote social justice and human rights. The inclusion of knowledge beyond the scientific also strengthens communities' capacity to adapt, as these solutions are more relevant, contextualized and suited to local specificities.

For these reasons, urban responses to climate change have become increasingly essential and will continue to be key to building resilience in cities and protecting human rights. It is crucial, therefore, that these responses reflect the complex and multifaceted nature of the problem.

In this way, the project analyzed showed important aspects in the direction of good climate governance, which can be replicated throughout the Brazilian context. The analysis showed that the adaptation agenda in Brazilian cities is recent, with all adaptation plans published since 2016, including the National Adaptation Plan, which has been under review since 2024. Climate change adaptation planning is fundamental to ensuring that cities are prepared to face the adverse impacts that may arise in various areas, such as infrastructure, health and food security. However, the effectiveness of this planning depends on the effective implementation of the proposed policies and actions. For this implementation to take place satisfactorily, it is crucial that there is genuine political commitment, with the appropriate allocation of financial and human resources, as well as the training of the agents involved. The active participation of the community, including vulnerable groups, is essential to ensure that adaptation strategies are inclusive and meet local needs. In addition, continuous monitoring and evaluation of the actions implemented are necessary to adjust and improve policies over time.

The analysis made it possible to come up with five practical recommendations for good urban climate governance aimed at protecting human rights:

1. Strengthening coordination and cooperation across different levels of governance;
2. Encouraging the participation and engagement of stakeholders from diverse social segments, ensuring equitable and inclusive representation in the climate governance process;
3. Integrating and coordinating policies and actions related to climate adaptation and resilience across sectors, with a focus on reducing inequalities and promoting equity;
4. Adopting an integrated and inclusive approach to climate impacts that considers the interconnections among various dimensions of urban life, while being sensitive to the needs and priorities of the most vulnerable communities;
5. Integrating and valuing multiple forms of knowledge - including scientific, traditional, indigenous, ecological, and community knowledge in climate governance.

This research does not exhaust the topic; more detailed case studies are needed to examine both successful and unsuccessful urban climate governance initiatives, with a focus on identifying the critical factors that contribute to their success or failure in promoting human rights. Future research should therefore prioritize the implementation of these recommendations and assess their tangible impacts on communities.

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