

Cities in Latin America and Adaptation: A Review of Policies to Address the Climate Crisis

Caroline Macedo de Souza

Master's student in Architecture and Urbanism, UFES, Brazil
caroline.m.souza@ufes.edu.br
ORCID iD: 0009-0004-9904-3007

Cristina Engel de Alvarez

PhD Professor, UFES, Brasil
cristina.engel@ufes.br
ORCID iD: 0000-0002-3898-8515

Submissão: 05/02/2025

Aceite 20/05/2025

SOUZA, Caroline Macedo de; ALVAREZ, Cristina Engel de. Cidades da América Latina e Adaptação: Uma Revisão Sobre Políticas de Enfrentamento à Crise Climática. **Revista Nacional de Gerenciamento de Cidades**, [S. l.], v. 13, n. 90, p. e2521, 2025. DOI: [10.17271/23188472139020256195](https://doi.org/10.17271/23188472139020256195). Disponível

em: https://publicacoes.amigosdanatureza.org.br/index.php/gerenciamento_de_cidades/article/view/6195.

Licença de Atribuição CC BY do Creative Commons <https://creativecommons.org/licenses/by/4.0/>

Cidades da América Latina e Adaptação: Uma Revisão Sobre Políticas de Enfrentamento à Crise Climática

RESUMO

Objetivo - identificar as tendências da produção científica sobre políticas de adaptação climática em ambientes urbanos na América Latina, explorando-se também a existência de planos que envolvam dois ou mais países da mesma região, extrapolando fronteiras.

Metodologia – Revisão Bibliográfica Sistemática, com consultas em três bases de dados científicos (*Scopus*, *Science Direct* e *Web of Science*). Ao final das etapas de filtros e aplicação de critérios de inclusão e exclusão, foram analisados 58 artigos, divididos em 04 grupos temáticos.

Originalidade/relevância - Diante da necessidade urgente de adaptação climática nas cidades da América Latina, o estudo atua sobre a lacuna de abordagens multinível de políticas de adaptação, que costumam existir apenas em escalas municipais, estaduais ou nacionais, não abordando assuntos que ultrapassem fronteiras.

Resultados - Os resultados desta revisão sistemática indicaram uma concentração significativa de estudos e produção científica focadas principalmente no diagnóstico e planejamento, com poucas análises de iniciativas já implantadas. Constatou-se ainda a falta de abordagens integradas e multinível para a adaptação climática entre países da América Latina.

Contribuições teóricas/metodológicas – A pesquisa constatou a existência de raros estudos e iniciativas de adaptação climática que extrapolem fronteiras locais e nacionais, o que pode ser reflexo da forma como as políticas são criadas e discutidas, apontando uma importante lacuna de pesquisa a ser explorada.

Contribuições sociais e ambientais – Destaca-se, dentre os resultados do estudo, que a participação popular é estratégica para criação de políticas de adaptação eficientes. Neste contexto, indica-se que sejam feitos investimentos em educação popular sobre o tema, viabilizando medidas de adaptação mais justas e eficazes.

PALAVRAS-CHAVE: Adaptação Climática. Políticas Públicas. Urbano. América Latina.

2

Cities in Latin America and Adaptation: A Review of Policies to Address the Climate Crisis

ABSTRACT

Objective – To identify the trends in scientific production regarding climate adaptation policies in urban environments in Latin America, also exploring the existence of plans that involve two or more countries from the same region, transcending borders.

Methodology – Systematic Literature Review, with searches in three scientific databases (*Scopus*, *Science Direct*, and *Web of Science*). After the filtering steps and application of inclusion and exclusion criteria, 58 articles were analyzed, divided into 04 thematic groups.

Originality/Relevance – Given the urgent need for climate adaptation in Latin American cities, the study addresses the gap of multilevel approaches to adaptation policies, which tend to exist only at municipal, state, or national scales, failing to address issues that transcend borders.

Results – The results of this systematic review indicated a significant concentration of studies and scientific production focused mainly on diagnosis and planning, with few analyses of already implemented initiatives. Furthermore, a lack of integrated and multilevel approaches to climate adaptation among Latin American countries was noted.

Theoretical/Methodological Contributions – The research found the existence of rare studies and climate adaptation initiatives that transcend local and national borders, which may reflect how policies are created and discussed, pointing to an important research gap to be explored.

Social and Environmental Contributions – Among the study's results, it is highlighted that public participation is strategic for the creation of efficient adaptation policies. In this context, it is suggested that investments be made in public education on the topic, enabling more just and effective adaptation measures.

KEYWORDS: Climate Adaptation. Public Policies. Urban. Latin America.

Ciudades de América Latina y Adaptación: Una Revisión Sobre Políticas de Enfrentamiento a la Crisis Climática

RESUMEN

Objetivo – identificar las tendencias de la producción científica sobre políticas de adaptación climática en entornos urbanos en América Latina, explorando también la existencia de planes que involucren a dos o más países de la misma región, extrapolando fronteras.

Metodología – Revisión Bibliográfica Sistemática, con consultas en tres bases de datos científicas (Scopus, Science Direct y Web of Science). Al final de las etapas de filtrado y aplicación de criterios de inclusión y exclusión, se analizaron 58 artículos, divididos en 04 grupos temáticos.

Originalidad/Relevancia – Ante la necesidad urgente de adaptación climática en las ciudades de América Latina, el estudio aborda la laguna de enfoques multinivel de políticas de adaptación, que suelen existir solo a escalas municipales, estatales o nacionales, sin abordar asuntos que traspasen fronteras.

Resultados – Los resultados de esta revisión sistemática indicaron una concentración significativa de estudios y producción científica enfocados principalmente en el diagnóstico y la planificación, con pocos análisis de iniciativas ya implementadas. Se constató además la falta de enfoques integrados y multinivel para la adaptación climática entre países de América Latina.

Contribuciones Teóricas/Metodológicas – La investigación constató la existencia de escasos estudios e iniciativas de adaptación climática que extrapolen fronteras locales y nacionales, lo que puede ser un reflejo de la forma en que las políticas son creadas y discutidas, señalando una importante laguna de investigación a ser explorada.

Contribuciones Sociales y Ambientales – Se destaca, entre los resultados del estudio, que la participación popular es estratégica para la creación de políticas de adaptación eficientes. En este contexto, se indica que se realicen inversiones en educación popular sobre el tema, viabilizando medidas de adaptación más justas y eficaces.

PALABRAS CLAVE: Adaptación Climática. Políticas Públicas. Urbano. América Latina.

1 INTRODUCTION

Throughout the 20th century, the scientific community increasingly warned society about the impacts of human lifestyles and consumption patterns on the Earth's climate and ecosystems. Over the years, the body of evidence and scientific proof supporting these warnings has grown significantly. The most recent synthesis report from Working Group III of the Intergovernmental Panel on Climate Change (IPCC) emphasizes that the window of opportunity for humanity to ensure a sustainable and habitable future for all is closing (IPCC, 2023, p. 33, emphasis added).

Climate Change is considered to present multidimensional risks, affecting both society and the environment at local, regional, and global levels. In the case of Central and South America, strategies to address these risks must particularly account for climate events such as extreme rainfall, urban flooding, landslides, storms, wildfires, the spread of disease-carrying vector insects, and other occurrences that damage existing infrastructure and disrupt economic activities, ultimately affecting the well-being of both the population and the natural environment (IPCC, 2023, p. 11, emphasis added).

In an effort to unite nations in combating the climate crisis, the Paris Agreement, signed by 175 countries in 2015, set goals across three key pillars: mitigation, adaptation, and economy. However, the efforts made thus far have proven insufficient to meet the targets of this agreement, as well as those outlined in the United Nations' 2030 Agenda, also adopted in 2015.

As cities in South and Central America struggle to address the immediate needs of their populations in the wake of environmental disasters, they are simultaneously under pressure to develop climate adaptation plans, reduce emissions, and establish sustainable development targets. Socio-demographic and economic complexities, along with the lack of reliable historical data, combined with other social, economic, and technical factors, exacerbate the challenges of proposing adaptation tools for cities in Central and South America (IPCC, 2023, p. 18, emphasis added).

More vulnerable territories, such as informal settlements, present greater environmental fragility, and should have urban policies that focus more on the effectiveness of interventions, so that they move beyond just the planning level (Bezerra, Bobyleva e Mello, 2025). Overcoming this scenario demands, therefore, the incorporation of instruments that can confront climate extremes while simultaneously overcoming socio-territorial inequalities (Hidalgo Junior, Soto e Araujo, 2025).

2 OBJECTIVES

The primary objective of this research was to identify trends in scientific production on climate adaptation policies in urban environments in Latin America. Furthermore, considering that the issue of climate change transcends established political boundaries, the study also aimed to determine whether there are plans involving two or more countries within the same region.

3 METHODOLOGY

A Systematic Literature Review (SLR) was chosen as the methodology for this study, organized into five distinct steps. Initially, an advanced search was conducted using three well-regarded and reliable scientific databases: Scopus, Science Direct, and CAPES Journals. To avoid inconsistent results, the same combinations of keywords were used across all databases. To ensure the results aligned with the research objective, the keywords and Boolean operators were carefully selected, resulting in a search string applied uniformly across the three databases. After executing the searches in each database, filters were applied to optimize the results (Table 01). The filters used included type (scientific articles and review articles), language (Spanish, English, and Portuguese), and publication year (2015 to 2024), considering works published after the Paris Agreement in 2015.

Table 01 – Criteria for Inclusion and Exclusion of Articles

Consulted journal	Search string	First Result	APPLIED FILTERS			
			Articles / Research article	Portuguese, English, and Spanish	2015 - 2023	Number of articles obtained
Periódicos Capes	"climate adaptation" AND policy AND (urban OR city) AND ("latin america" OR brazil) NOT "United States of America" NOT "Europe"	22	13	12	08	08
Science Direct	"climate adaptation" AND policy AND (urban OR city) AND ("latin america" OR brazil) NOT ("United States of America" OR Europe)	272	216	na	194	194
Scopus	"climate adaptation" AND policy AND urban OR city AND "latin america" OR brazil AND NOT ("United States of America" OR Europe)	10	07	07	07	07
Total		304	226	19	209	209

Source: Prepared by the authors (2024)

For data processing, the Excel software was initially used to import the search results in ".XLSL" format. After removing duplicate articles, an initial filtering process was conducted based on inclusion and exclusion criteria (Table 02), starting with a review of the article titles. During this initial stage, five articles were excluded due to duplication, 119 articles were excluded for not meeting the established criteria, and 85 articles were selected for the abstract review and classification step.

Table 02 – Criteria for Inclusion and Exclusion of Articles

Criteria Number	Criteria for Inclusion of Articles
01	Addresses aspects inherent to climate adaptation in the urban environment or urban infrastructure.
02	Covers policies or methodologies for climate adaptation.
03	Discusses territories in Latin America or Brazil.
Criteria Number	Criteria for Exclusion of Articles
01	Does not address the urban environment or urban infrastructure.
02	Does not cover climate adaptation or policies related to urban infrastructure adaptation.
03	Does not discuss Brazil or other Latin American countries.

Source: Prepared by the authors (2024).

The review of the abstracts of pre-selected articles identified those that did not fully meet the inclusion criteria, resulting in their exclusion. This process yielded a final set of 58 articles for full-text reading and analysis. These publications were classified according to research themes, territorial contexts analyzed, and types of research (Table 03), as well as by the countries studied. The correlation between these groups and the topics addressed is discussed in the results chapter.

Table 03 – Article Classification Groups

Group 01: Themes		
#	Theme	Theme Description
1.1	Risk Management and Disaster Response	Studies that are related to the identification and monitoring of risks, decision-making, and the creation of adaptation policies, as well as mitigation, response, and impact assessment of natural disasters.
1.2	Infrastructure and Urban Planning	Related to the management, maintenance, or development of infrastructure and urban planning policies aimed at climate adaptation and addressing extreme events.
1.3	Climate and Spatial Justice	Examines issues related to the establishment or absence of Climate Justice in territories and social groups affected by climate change, with migration, gentrification, and social inequality as key topics.
1.4	Policy, Economy, and Legislation	Focuses on the institutionalization of climate adaptation initiatives, the development or analysis of financing mechanisms, and the evaluation of existing policies and regulatory frameworks.
Group 02: Articles Inclusion Criteria		
#	Territorial Context	Description of Territorial Context
2.1	Urban	The study focuses on the urban environment.
2.2	Urban and rural	The study examines municipalities with a mixed territorial configuration, encompassing both rural and urban areas.
2.3	Coastal / Littoral	The study analyzes coastal regions or seaside cities.
2.4	Others	The study investigates areas with diverse geographical configurations, such as mountainous regions, as well as articles in which the analyzed territory is not explicitly defined.
Group 03: Article Types		
#	Type	Type Description
3.1	Policy Analysis	Evaluates existing public policies related to Climate Adaptation, which may include comparative or non-comparative analyses.

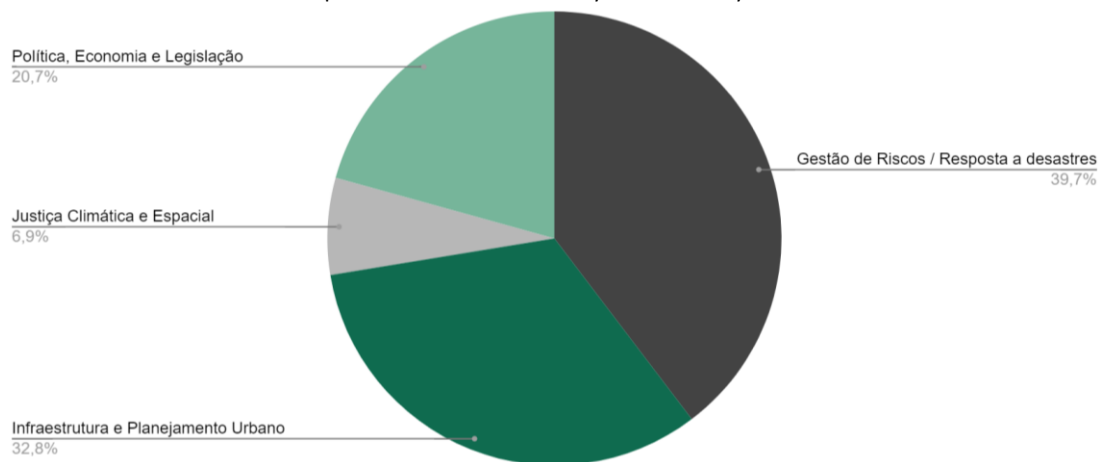
3.2	Case Study	Conducts case studies on the implementation of actions, infrastructure projects, or policies for climate adaptation, as well as community-led and grassroots solutions on the subject.
3.3	Methodology Proposal	Proposes methodologies or technological tools for the development or monitoring of climate adaptation policies, potentially integrating case studies and literature reviews.
3.4	Literature Review	Conducts literature reviews on topics related to this research.
3.5	Others	Employs methodologies distinct from those previously listed, such as research based on interviews or data collection regarding existing policies and legislation.

Source: Prepared by the authors (2024)

3.1. Analysis of Collected Data

From the initial extraction of 204 articles from the consulted databases, 58 were selected for full reading and classified into groups, as previously demonstrated in Table 02. Proportionally, the largest number of analyzed articles focused on topics related to Risk Management and Disaster Response (39.7%). Similar to the second-largest category, Infrastructure and Urban Planning, most articles in these groups proposed methodologies or tools for evaluating or analyzing policies or risks associated with environmental disasters caused by extreme climate events (Graph 01).

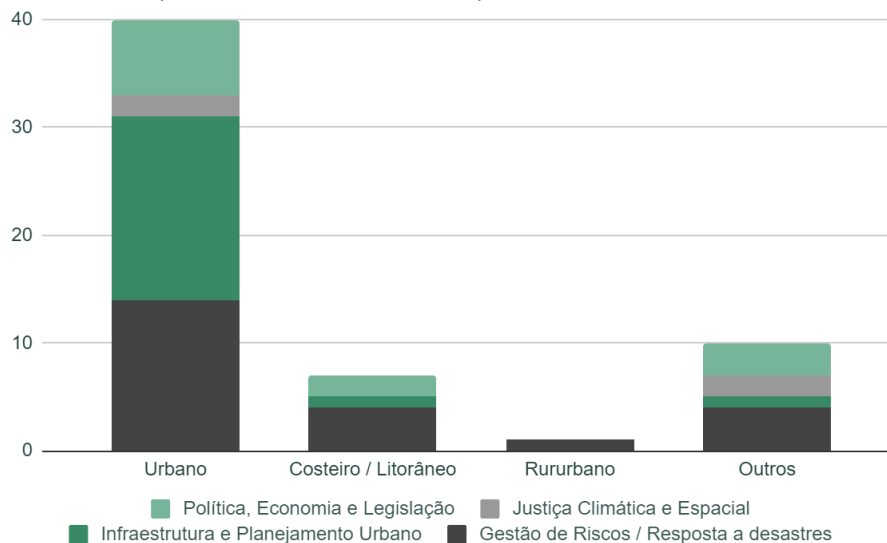
Graph 01 – Distribution of Analyzed Articles by Theme



Source: Prepared by the authors (2024).

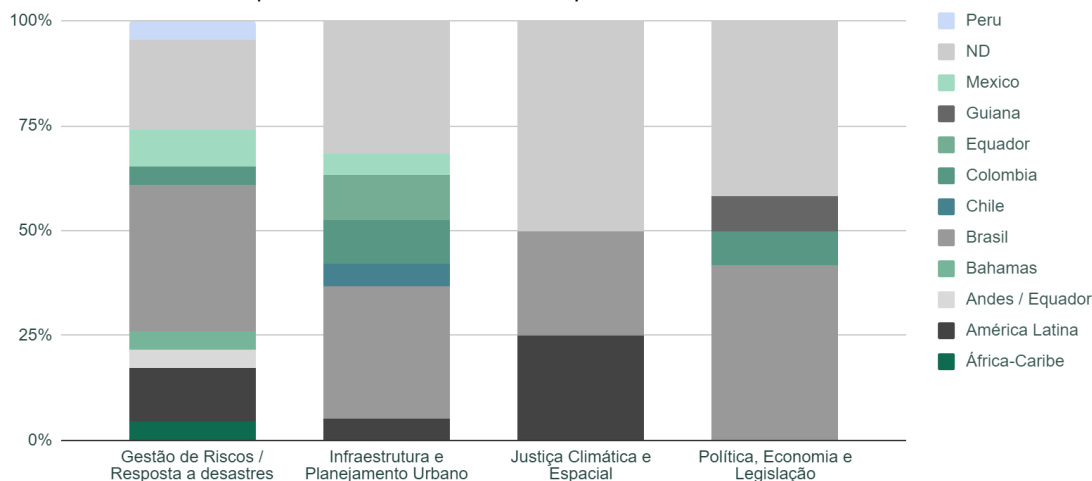
Regarding the territorial characteristics addressed in the articles (Graph 02), 12.07% specifically focused on coastal and shoreline regions, while the "others" category, which includes articles without defined study territories as well as those on Andean regions, accounted for 17.24% of the results in this group. Concerning the countries studied, in addition to Brazil, the articles referenced Ecuador, the Bahamas, Chile, Colombia, Guyana, Mexico, and Peru (Graph 03). There were articles that analyzed groups of countries by continent — Latin America, Africa, and the Caribbean—while 31.03% of the articles did not specify a precise territorial focus and were categorized as "ND" (not defined).

Graph 02 – Distribution of Articles by Territorial Context and Theme

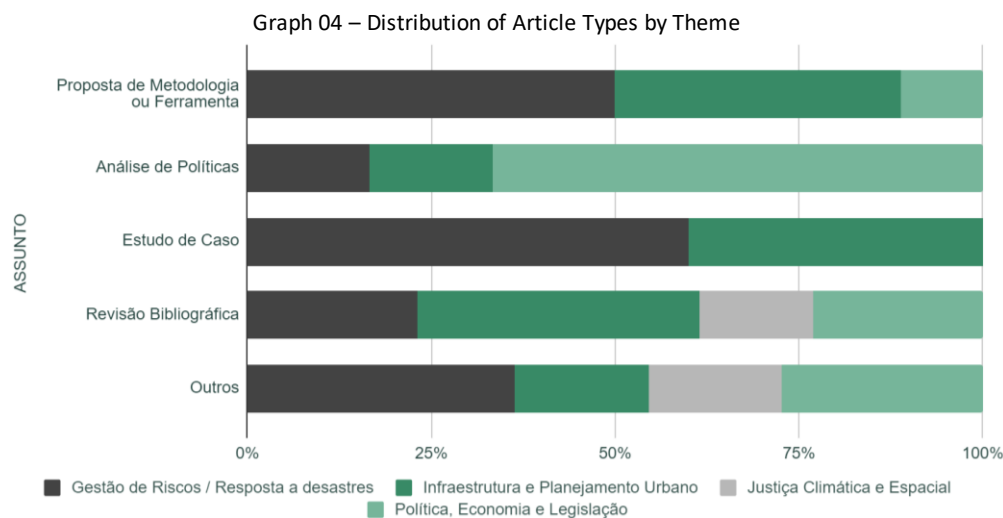


Source: Prepared by the authors (2024).

Graph 03 – Distribution of Articles by Territorial Context and Theme



Source: Prepared by the authors (2024)



As for article types—Methodology or Tool Proposals, Policy Analyses, Case Studies, and Literature Reviews—methodology proposals represented 31.03% of the total, covering three of the four identified themes, with the exception of Climate and Spatial Justice. The second most represented category was Literature Reviews, accounting for 22.41% of the total. Case Studies made up 17.24% of the articles, ranking below the "others" category, which represented 18.97% (Graph 04). Finally, Table 02 provides a detailed breakdown of the number of articles evaluated in each group.

Table 04 – Articles Categorized by Groups

Grupo		Gestão de Riscos / Resposta a Desastres	Infraestrutura e Planejamento Urbano	Justiça Climática e Espacial	Política, Economia e Legislação	TOTAL
Contexto Territorial	Urbano	14	17	2	7	40
	Costeiro / Litorâneo	4	1	0	2	7
	Rural - urbano	1	0	0	0	1
	Outros	4	1	2	3	10
Tipos de Artigo	Proposta de Metodologia ou Ferramenta	9	7	0	2	18
	Análise de Políticas	1	1	0	4	6
	Estudo de Caso	6	4	0	0	10
	Revisão Bibliográfica	3	5	2	3	13
	Outros	4	2	2	3	11

Source: Prepared by the authors (2024)

4 RESULTS

The results were organized into thematic axes: Risk Management and Disaster Response; Infrastructure and Urban Planning; Climate and Spatial Justice; and Policy, Economy, and Legislation, as presented below.

4.1. Gestão de Riscos e Resposta a Desastres

In the thematic group of articles on Risk Management and Disaster Response, the primary risks discussed include flooding, sea-level rise, landslides, wildfires, and urban heat islands. Most articles in this group focus on proposals for methodologies, tools, or case studies.

Among the proposed methodologies and tools, solutions are presented for analyzing the economic impacts (Adeel et al., 2020; Dos Santos; Barbassa; Vasconcelos, 2021) and social impacts of extreme climate events in Latin America. Multilevel risk evaluations and policy assessments are also discussed (Adeel et al., 2020; Gonçalves Sales, 2023; Lisboa et al., 2024; Santos et al., 2024). These methodologies aim to propose ways to manage, evaluate, and monitor risks, but no methodologies offering adaptive solutions to these risks were identified. It is notable, however, that social participation is crucial to the effectiveness of these methodologies, which require further studies and testing for large-scale application (Manes et al., 2023a).

The majority of articles on disaster risk management focus on urban environments in general. Two particularly vulnerable territorial contexts to extreme climate events are highlighted: coastal and shoreline cities, and informal settlements. For coastal cities, which are vulnerable to sea-level rise, Nature-Based Solutions (NBS) (Manes et al., 2023b) and Ecosystem-Based Solutions (Lacambra et al., 2024) are suggested as promising adaptation alternatives. For informal settlements, the findings emphasize the importance of improving the social construction of risk perception within communities (Bonatti et al., 2019; Miranda Sara et al., 2016; Rodríguez-Gabiria; Rivera-Flórez; Albuquerque, 2024), with public education on the topic being particularly significant (Miranda Sara et al., 2016).

Aspects such as the use of data by local populations (Manes et al., 2023) and the need for future research documenting local perceptions of climate hazards and comparing them with documented risks (Slovic et al., 2024) are considered relevant for the development of climate adaptation policies. Additionally, urban morphology and living conditions are identified as critical factors in this context (Slovic et al., 2024).

4.2. Infrastructure and Urban Planning

The articles addressing the theme of Infrastructure and Urban Planning highlight challenges both in the creation and institutionalization of adaptation policies and in their practical implementation. Although numerous municipal governments are incorporating climate adaptation into their agendas, the pace and success of these efforts vary (Di Giulio et al., 2018), often due to institutional limitations (Misleh et al., 2024) and difficulties faced by local authorities in integrating concepts such as climate adaptation and urban resilience into their

agendas (Chelleri; Schuetze; Salvati, 2015).

Vulnerable territories—such as slums—emerge as unique areas of study, given the specific requirements for implementing adaptation infrastructure in these locations. These studies emphasize the importance of local populations playing a central role in the creation of tailored policies for these areas (Núñez Collado, Wang, 2020; Rojas Bernal et al., 2022; Gallagher; Cruickshank, 2015).

Technological tools are presented as alternatives to help overcome institutional limitations in urban planning for climate adaptation. Diagnostic and planning support tools include frameworks like the **Framework for Incorporating Climate Projections in the Integrated Planning and Management of Urban Infrastructure** (Caprario et al., 2022), **Sustainability Cost Curves for Urban Infrastructure Planning** (Hoornweg; Hosseini; Kennedy, 2018), **Social Urban Metabolism Strategies (SUMS) for Cities** (Davis; Polit; Lamour, 2016), and **Planning Support Systems** (McEvoy et al., 2019). All these tools demonstrated positive results but were tested in specific locations, highlighting the need for broader-scale testing to determine their applicability in similar contexts.

The most frequently mentioned type of urban infrastructure among the studies classified in the group of Infrastructure and Urban Planning was water supply. In addition to evaluation and planning tools, the studies also highlight the importance of community participation processes in water resource management (Davis et al., 2016; Lee; Jepson, 2020; Rojas Bernal et al., 2022).

4.3. Climate and Spatial Justice

11

The thematic group of Climate and Spatial Justice is present in a transversal and subjective manner across all other groups, as seen in articles discussing the participation of vulnerable populations in diagnosing and managing risks in their communities. Consequently, only four articles that directly address the theme are classified within this group.

Aspects related to urban form are closely connected to varying degrees of spatial injustice. Elements such as the correlation between urban tree cover (Ju et al., 2023) and droughts (Sathler, 2021) demonstrate that populations with higher socioeconomic status have better access to urban spaces equipped with stronger infrastructure to withstand the climate crisis. A trend was identified in empirical studies that fail to use the pillars of climate justice to evaluate adaptive urban interventions, as well as a lack of concrete solutions to address the problem (Mohtat; Khirfan, 2021). In this context, resistance arises among populations against climate adaptation measures proposed by public authorities, particularly when these measures fail to consider the multidimensional socio-economic vulnerabilities of the affected populations (Vargas Falla; Brink; Boyd, 2024).

4.4. Policy, Economy, and Legislation

Analyses of policies and legislation concerning climate adaptation reveal challenges such as institutional constraints and the complex nature of addressing the issue in an integrated manner (Koch, 2018). There is a gap between the need for managers to improve the planning

and implementation of adaptation measures at the local level and the promotion of multisectoral cooperation (Da Veiga Lima; De Souza, 2022). Even when addressed in National Adaptation Plans (NAPs), these measures often take a long time to reach municipal levels of government, thereby complicating the scaling of investments in sustainable infrastructure (Pizzorni; Caldarice; Tollin, 2021; Studart; Gallagher, 2018).

The processes of discussing and institutionalizing Climate Adaptation Policies are portrayed not only in articles about Policy, Economy, and Legislation (Blazquez-Soriano; Ramos-Sandoval, 2022; Camargo; Ojeda, 2017; Essers; Cassimon; Prowse, 2021; Niemeyer; Vale, 2022) but also in those addressing popular mobilization initiatives (Bonatti et al., 2019; Chu; Anguelovski; Carmin, 2016; Iñiguez-Gallardo; Tzanopoulos, 2023; Kim et al., 2023; Mendes Barbosa; Walker, 2020; Miranda Sara et al., 2016; Tschakert et al., 2023). However, no clear patterns were identified in the process of transforming local initiatives into public policies.

A significant number of case studies on climate adaptation initiatives at various territorial scales—from community-level to state and national initiatives—were found. However, no relevant initiatives operating at a multilevel scale transcending national borders were identified (Pizzorni et al., 2021). This difficulty may stem from regional differences in understanding and implementing climate risk management (Nagy et al., 2019), knowledge gaps regarding the internal organization of institutions responsible for climate policies (Marquardt; Fünfgeld; Elsässer, 2023), and challenges in establishing consensus on the concept of Climate Adaptation Policies (Pizzorni et al., 2021).

5 CONCLUSIONS

12

The results of this systematic review revealed a significant concentration of studies and scientific production related to infrastructure and urban planning. However, it became evident that most studies are limited to specific territorial scales, usually confined within the boundaries of municipalities, states, or individual countries. Furthermore, there is a notable lack of integrated and multilevel approaches to climate adaptation among Latin American countries.

A recurrent theme in the reviewed articles is the institutional challenges in creating public policies, highlighting a need for consolidated analyses not only of existing policies but also of the functioning of the institutions responsible for operationalizing adaptation strategies. The prevalence of studies focusing on urban environments at well-defined territorial scales—municipal, state, or national—underscores the absence of research on climate adaptation initiatives that transcend state or national borders within Latin America. Institutional difficulties faced by municipalities are not limited to a lack of understanding of the subject but also include challenges in securing funding for the implementation of adaptation solutions.

The transformation of local initiatives into effective public policies also proved to be a complex challenge, with no clear patterns identified in the process of institutionalization and significant difficulties in taking concrete actions to promote climate justice. Barriers include the varying levels of understanding among the institutions involved, knowledge gaps regarding climate risk management, and difficulties in establishing a consensus on the concept of climate adaptation policies.

When evaluating the incorporation of social justice themes in articles proposing tools

and methodologies for climate adaptation, it is evident that such proposals are more effective when accompanied by public participation at all stages of the process. The absence of public participation in the planning of adaptation measures can negatively affect the population's risk perception, leading to resistance and rendering the implemented actions ineffective, even in areas where populations are most vulnerable to climate change. In this regard, promoting public education on climate change emerges as a strategic approach to fostering social justice in adaptation measures.

In summary, climate adaptation policies in Latin America and Brazil face significant challenges, ranging from the lack of integrated approaches between countries to the need for greater interinstitutional cooperation and deeper economic and legislative analyses. To effectively address climate change and ensure a sustainable and habitable future, efforts must focus on overcoming these institutional barriers, strengthening regional collaboration, and improving existing policies based on a comprehensive understanding of the social, economic, and technical complexities involved in climate adaptation.

Although the challenge is complex, certain approaches show promise, such as investing in widespread public education and accessible information dissemination on climate change, increasing public participation in the creation of local solutions, and encouraging government institutions to invest in research and technologies that enable the institutional innovation necessary to adapt to the new climatic reality.

6 REFERÊNCIAS BIBLIOGRÁFICAS

ADEEL, Z. et al. Developing a comprehensive methodology for evaluating economic impacts of floods in Canada, Mexico and the United States. **International Journal of Disaster Risk Reduction**, v. 50, p. 101861, 2020. Disponível em: <https://www.sciencedirect.com/science/article/pii/S2212420920313637>. Accessed on: april 20, 2025.

BLAZQUEZ-SORIANO, A.; RAMOS-SANDOVAL, R. Information transfer as a tool to improve the resilience of farmers against the effects of climate change: The case of the Peruvian National Agrarian Innovation System. **Agricultural Systems**, v. 200, p. 103431, 2022. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0308521X22000671>. Accessed on: april 20, 2025.

BONATTI, M. et al. Social representations of climate change and climate adaptation plans in southern Brazil: Challenges of genuine participation. **Urban Climate**, v. 29, p. 100496, 2019. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2212095518301494>. Accessed on: 20abr 2025.

CAMARGO, A.; OJEDA, D. Ambivalent desires: State formation and dispossession in the face of climate crisis. **Political Geography**, v. 60, p. 57–65, 2017. Disponível em <https://www.sciencedirect.com/science/article/abs/pii/S0962629816301020>. Accessed on: april 20, 2025.

CAPRARIO, J. et al. Framework for incorporating climate projections in the integrated planning and management of urban infrastructure. **Urban Climate**, v. 41, p. 101060, 2022. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S221209552100290X>. Accessed on april 202025.

CHELLERI, L.; SCHUETZE, T.; SALVATI, L. Integrating resilience with urban sustainability in neglected neighborhoods: Challenges and opportunities of transitioning to decentralized water management in Mexico City. **Habitat International**, v. 48, p. 122–130, 2015. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0197397515000648>. Accessed on: april 202025.

- CHU, E.; ANGUELOVSKI, I.; CARMIN, J. Inclusive approaches to urban climate adaptation planning and implementation in the Global South. **Climate Policy**, v. 16, n. 3, p. 372–392, 2016. Disponível em: <https://www.tandfonline.com/doi/full/10.1080/14693062.2015.1019822>. Accessed on: april 20, 2025.
- DA VEIGA LIMA, F. A.; DE SOUZA, D. C. Climate change, seaports, and coastal management in Brazil: An overview of the policy framework. **Regional Studies in Marine Science**, v. 52, p. 102365, 2022. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2352485522001050>. Accessed on: april 20, 2025.
- DAVIS, M. J. M.; POLIT, D. J.; LAMOUR, M. Social Urban Metabolism Strategies (SUMS) for Cities. **Procedia Environmental Sciences**, v. 34, p. 309–327, 2016. Disponível em: <https://www.sciencedirect.com/science/article/pii/S1878029616300500>. Accessed on: april 20, 2025.
- DI GIULIO, G. M. et al. Mainstreaming climate adaptation in the megacity of São Paulo, Brazil. **Cities**, v. 72, p. 237–244, 2018. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0264275117300471>. Accessed on: april 20, 2025.
- DOS SANTOS, M. F. N.; BARBASSA, A. P.; VASCONCELOS, A. F. Low impact development strategies for a low-income settlement: Balancing flood protection and life cycle costs in Brazil. **Sustainable Cities and Society**, v. 65, p. 102650, 2021. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2210670720308660>. Accessed on april 20, 2025.
- ESSERS, D.; CASSIMON, D.; PROWSE, M. Debt-for-climate swaps: Killing two birds with one stone? **Global Environmental Change**, v. 71, p. 102407, 2021. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0959378021001862>. Accessed on: april 20, 2025.
- GALLAGHER, D.; CRUICKSHANK, H. Planning under new extremes: resilience and the most vulnerable. **Proceedings of the Institution of Civil Engineers - Municipal Engineer**, v. 169, n. 3, p. 127–137, 2015. Disponível em: <https://www.sciencedirect.com/org/science/article/abs/pii/S1751769915000121>. Accessed on april 20, 2025.
- GONÇALVES SALES, V. Assessing the impact of governance policies on landslide risk in Brazilian municipalities. **International Journal of Disaster Risk Reduction**, v. 99, p. 104058, 2023. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2212420923005381>. Accessed on: april 20, 2025.
- HIDALGO JUNIOR, Massaguer; SOTO, Gabriella Rodrigues Bertero; ARAUJO, Eloisa Carvalho de. Socio-environmental disasters on Brazilian soil – is it possible to avoid them when the issue is associated with urban waters?. **Revista Nacional de Gerenciamento de Cidades**, [S. l.], v. 13, n. 88, 2025. DOI: 10.17271/23188472138820255779. Available at: https://publicacoes.amigosdanatureza.org.br/index.php/gerenciamento_de_cidades/article/view/5779. Accessed on: Oct. 22, 2025.
- HOORNWEG, D.; HOSSEINI, M.; KENNEDY, C. Sustainability cost curves for urban infrastructure planning. **Proceedings of the Institution of Civil Engineers - Civil Engineering**, v. 171, n. 6, p. 11–21, 2018. Disponível em: <https://www.sciencedirect.com/org/science/article/abs/pii/S0965089X18000277>. Accessed on: april 20, 2025.
- IÑIGUEZ-GALLARDO, V.; TZANOPOULOS, J. Perceptions of Climate Adaptation and Mitigation: An Approach from Societies in Southern Ecuadorian Andes. **Sustainability**, v. 15, n. 2, p. 1086, 6 jan. 2023. Disponível em: <https://www.mendeley.com/catalogue/1ab8205c-0dbe-3db4-983f-f7584afc7dfc/>. Accessed on: april 20, 2025.
- JU, Y. et al. Recent greening may curb urban warming in Latin American cities of better economic conditions. **Landscape and Urban Planning**, v. 240, p. 104896, 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0169204623002153>. Accessed on: april 20, 2025.
- KIM, H. et al. Health justice and economic segregation in climate risks: Tracing vulnerability and readiness progress. **Health & Place**, v. 84, p. 103113, 2023. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S1353829223001508>. Accessed on: april 20, 2025.
- KOCH, F. Mainstreaming adaptation: a content analysis of political agendas in Colombian cities. **Climate and Development**, v. 10, n. 2, p. 179–192, 2018. Disponível em: <https://www.tandfonline.com/doi/full/10.1080/17565529.2016.1223592>. Accessed on: april 20, 2025.

LACAMBRA S, C. L. et al. Coastal ecosystems contribution to climate adaptation and disasters risk management in the tropical Americas. **Nature-Based Solutions**, v. 5, p. 100112, 2024. Disponível em: <https://www.sciencedirect.com/science/article/pii/S277241152400003X>. Accessed on: april 20, 2025.

LEE, K.; JEPSON, W. Drivers and barriers to urban water reuse: A systematic review. **Water Security**, v. 11, p. 100073, 2020. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2468312420300134>. Accessed on: april 20, 2025.

LISBOA, M. A. N. et al. Diversity, structure, and carbon sequestration potential of the woody flora of urban squares in the Brazilian semiarid region. **Trees, Forests and People**, v. 16, p. 100561, 2024. Disponível em: <https://www.sciencedirect.com/science/article/pii/S2666719324000682>. Accessed on: april 20, 2025.

MANES, S. et al. Nature as a solution for shoreline protection against coastal risks associated with ongoing sea-level rise. **Ocean & Coastal Management**, v. 235, p. 106487, 2023a. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0964569123000121>. Accessed on: april 20, 2025.

MARQUARDT, J.; FÜNFELD, A.; ELSÄSSER, J. P. Institutionalizing climate change mitigation in the Global South: Current trends and future research. **Earth System Governance**, v. 15, p. 100163, 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S2589811622000325>. Accessed on: april 20, 2025.

MCEVOY, S. et al. The influence of context on the use and added value of Planning Support Systems in workshops: An exploratory case study of climate adaptation planning in Guayaquil, Ecuador. **Computers, Environment and Urban Systems**, v. 77, p. 101353, 2019. Disponível em: <https://www.sciencedirect.com/science/article/pii/S019897151830543X>. Accessed on: april 20, 2025.

MENDES BARBOSA, L.; WALKER, G. Epistemic injustice, risk mapping and climatic events: Analysing epistemic resistance in the context of favela removal in Rio de Janeiro. **Geographica Helvetica**, v. 75, n. 4, p. 381–391, 12 nov. 2020. Disponível em: <https://www.mendeley.com/catalogue/7d03f011-6ead-33d2-abe1-07fad82be6ed/>. Accessed on: april 20, 2025.

MIRANDA SARA, L. et al. Risk perception: The social construction of spatial knowledge around climate change-related scenarios in Lima. **Habitat International**, v. 54, p. 136–149, 2016. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0197397515303180>. Accessed on: april 20, 2025.

MISLEH, D. et al. Sustainability against the logics of the state: Political and institutional barriers in the Chilean infrastructure sector. **Environmental Innovation and Societal Transitions**, v. 51, p. 100842, 2024. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0197397515303180>. Accessed on: april 20, 2025.

MOHTAT, N.; KHIRFAN, L. The climate justice pillars vis-à-vis urban form adaptation to climate change: A review. **Urban Climate**, v. 39, p. 100951, 2021. Disponível em: <https://www.sciencedirect.com/science/article/pii/S2212095521001814>. Accessed on: april 20, 2025.

NAGY, G. J. et al. Climate vulnerability, impacts and adaptation in Central and South America coastal areas. **Regional Studies in Marine Science**, v. 29, p. 100683, 2019. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2352485518304845>. Accessed on: april 20, 2025.

NIEMEYER, J.; VALE, M. M. Obstacles and opportunities for implementing a policy-mix for ecosystem-based adaptation to climate change in Brazil's Caatinga. **Land Use Policy**, v. 122, p. 106385, 2022. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0264837722004124>. Accessed on: april 20, 2025.

NÚÑEZ COLLADO, J. R.; WANG, H.-H. Slum upgrading and climate change adaptation and mitigation: Lessons from Latin America. **Cities**, v. 104, p. 102791, 2020. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0264275119301040>. Accessed on: april 20, 2025.

PIZZORNI, M.; CALDARICE, O.; TOLLIN, N. A Methodological Framework to Assess the Urban Content in Climate Change Policies. **Valori e Valutazioni**, n. 29, p. 123–132, 2021. Disponível em: https://sieev.org/wp-content/uploads/2022/01/09_PIZZORNI-ET-AL.pdf. Accessed on: april 20, 2025.

RODRÍGUEZ-GAVIRIA, E. M.; RIVERA-FLÓREZ, L. A.; ALBUQUERQUE, J. P. DE. Enhancing equity of the post-disaster recovery governance through community data generation. **International Journal of Disaster Risk Reduction**, v. 111,

p. 104700, 2024. Disponível em: <https://www.sciencedirect.com/science/article/pii/S221242092400462X>. Accessed on april 20, 2025.

ROJAS BERNAL, C. L. et al. Neglected landscapes and green infrastructure: The case of the Limas Creek in Bogotá, Colombia. **Geoforum**, v. 136, p. 194–210, 2022. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0016718522002020>. Accessed on: april 20, 2025.

SANTOS, C. A. G. et al. Coastal evolution and future projections in Conde County, Brazil: A multi-decadal assessment via remote sensing and sea-level rise scenarios. **Science of The Total Environment**, v. 915, p. 169829, 2024. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0048969723084619>. Accessed on: april 20, 2025.

SATHLER, D. Understanding human development, poverty and water scarcity patterns in the Brazilian Semi-arid through cluster analysis. **Environmental Science & Policy**, v. 125, p. 167–178, 2021. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S1462901121002501>. Accessed on: april 20, 2025.

SLOVIC, A. D. et al. Climate hazards in Latin American cities: Understanding the role of the social and built environments and barriers to adaptation action. **Climate Risk Management**, v. 45, p. 100625, 2024. Disponível em: <https://www.sciencedirect.com/science/article/pii/S2212096324000421>. Accessed on: april 20, 2025.

STUDART, R.; GALLAGHER, K. Guaranteeing sustainable infrastructure. **International Economics**, v. 155, p. 84–91, 2018. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S2110701717302639>. Accessed on: april 20, 2025.

TSCHAKERT, P. et al. Methodological lessons for negotiating power, political capabilities, and resilience in research on climate change responses. **World Development**, v. 167, p. 106247, 2023. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0305750X23000657>. Accessed on: april 20, 2025.

VARGAS FALLA, A. M.; BRINK, E.; BOYD, E. Quiet resistance speaks: A global literature review of the politics of popular resistance to climate adaptation interventions. **World Development**, v. 177, p. 106530, 2024. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0305750X23003480>. Accessed on: april 20, 2025.

DECLARATIONS

AUTHOR CONTRIBUTIONS

- **Conceptualization and Study Design:** Caroline Macedo de Souza
- **Data Curation:** Caroline Macedo de Souza
- **Formal Analysis:** Caroline Macedo de Souza
- **Funding Acquisition:** No financial resources were required.
- **Investigation:** Caroline Macedo de Souza
- **Methodology:** Caroline Macedo de Souza and Cristina Engel de Alvarez
- **Writing - Original Draft:** Caroline Macedo de Souza
- **Writing - Critical Review:** Cristina Engel de Alvarez
- **Final Review and Editing:** Caroline Macedo de Souza and Cristina Engel de Alvarez
- **Supervision:** Cristina Engel de Alvarez

DECLARATION OF CONFLICTS OF INTEREST

We, **Caroline Macedo de Souza** and **Cristina Engel de Alvarez**, declare that for the manuscript titled “**Latin American Cities and Adaptation: A Review of Policies to Confront the Climate Crisis**”:

1. **Financial Ties:** We have no financial ties that could influence the results or interpretation of the work. No funding institution or entity was involved in the development of this study.
2. **Professional Relationships:** We have no professional relationships that could impact the analysis, interpretation, or presentation of the results. No professional relationship relevant to the content of this manuscript has been established.
3. **Personal Conflicts:** We have no personal conflicts of interest related to the content of the manuscript. No personal conflicts related to the content were identified.