

# The Geography of Inequality: Socio-Spatial Segregation and Climate Vulnerability in Brazilian Urban Peripheries

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## Abstract

This article elaborates on the relationship between socio-spatial segregation and climate vulnerability in urban peripheries, pointing out how the structural inequalities of cities are further deepened by climate change processes. The paper critically engages with the core question: How does urban planning, and its public policies fall short of protecting marginalized populations while prioritizing more central and valued areas? This research rests on a critical review of literature, referring to the theories of Henri Lefebvre, David Harvey, Flavio Villaça, Roberto Lobato Corrêa, Milton Santos, and Mike Davis. Their theories on the unequal production of urban space and the exclusion of poor populations are crucial for understanding data on the effects of climate change on Brazilian urban peripheries. The adopted methodology explores intersections between spatial segregation and climatic vulnerability, highlighting how the neoliberal model of urbanization deepens the exposure of peripheries to environmental risks. The research establishes the urgency of rethinking urban policies as the intensity of extreme weather events increases, suggesting fair solutions to promote climate justice. The study's findings indicate that the current configuration of urban space not only intensifies the marginalization of peripheries but also amplifies their vulnerability to climate crises. This underscores the need for urban planning that fairly redistributes investments and resources, prioritizing the most vulnerable areas and promoting socio-spatial inclusion.

**Keywords:** Socio-spatial Segregation. Climate Vulnerability, Urbanism

## 1. Introduction

Socio-spatial segregation and climatic vulnerability in urban peripheries are two sides of the same coin, intertwined demonstrations of structural inequalities imposed by capitalist dynamics in contemporary cities. These spaces, inhabited by historically marginalized populations, face not only economic and social exclusion but also the most severe impacts of climate change. This situation arises from an urbanization process that prioritizes capital accumulation and the valorization of central spaces, relegating peripheral areas to precarious conditions.

Urban theorists such as Flavio Villaça (2001) and Roberto Lobato Corrêa (2023) argue that urban spaces are structured to maximize exchange value, while David Harvey (2008) adds that urban neoliberalism turns cities into arenas of accumulation, perpetuating the exclusion of popular classes and intensifying their vulnerability to environmental risks. In this context, the issue becomes highly relevant as climate change exacerbates extreme events such as floods, landslides, and heat waves, acting as catalysts that amplify pre-existing socio-spatial

inequalities.

Populations living in peripheral areas, often characterized by inadequate or absent infrastructure, are disproportionately exposed to risks, while central areas, benefiting from greater structural resilience, receive investments and public policies that paradoxically reinforce spatial injustices. Mike Davis (2006), in his critical analysis of global urbanization, highlights that urban peripheries worldwide have been systematically transformed into sacrifice zones where environmental disasters strike with particular severity, often without effective state mechanisms for protection and mitigation.

Faced with this complex scenario, the central aim of this article is to analyze the interrelation between socio-spatial segregation and climate vulnerability, examining how urban public policies have proven insufficient or ineffective in addressing this structural inequality. The research highlights that the spatial distribution of climate change impacts aligns with existing socio-spatial segregation patterns, a phenomenon that not only deepens the marginalization of peripheral populations but also reveals the failure of urban planning to ensure climate justice.

This study aims to contribute to the advancement of knowledge at the intersection of urbanism, urban geography, and political ecology by offering a new perspective on the reformulation of public policies and urban planning practices that aim to mitigate socio-environmental vulnerabilities and promote more resilient and equitable cities. The methodology employed in this study is based on a critical and systematic bibliographic review, anchored in the theoretical contributions of thinkers such as Lefebvre (2009), Harvey (2008), Villaça (2001), Corrêa (2023), Santos (2023), and Davis (2006).

This methodological approach seeks to explore and synthesize their theories on the unequal production of urban space and the systematic exclusion of economically vulnerable populations, correlating them with empirical data on the impacts of climate change in peripheral areas. The analytical focus is on understanding how the configuration of urban space in Brazil, particularly in metropolises like São Paulo and Rio de Janeiro, acts as an amplifier of peripheral vulnerability in the face of emerging climate crises.

This approach aims not only to describe the observed phenomena but also to elaborate on a theoretical-analytical framework that allows a critical interpretation of contemporary urban dynamics and their implications for socio-environmental justice. This research is justified by the urgent need for a critical reassessment of urban planning practices and public policies that, rather than correcting historical inequalities, often perpetuate or exacerbate them. With the intensification of extreme climatic events, there is an urgent need for a thorough examination of the intersections between spatial inequality and climate change to propose solutions that promote equitable and inclusive urbanism.

Thus, the article seeks to contribute to this debate, offering a critique grounded in the existing gaps within the current urban model and outlining guidelines for the implementation of climate justice that effectively includes the most vulnerable populations, thereby promoting a paradigm shift in the conception and execution of resilient and socially just urban policies.

## **2. Theoretical Foundations: Socio-spatial Segregation and the Production of Urban Space**

Socio-spatial segregation is not merely a consequence of urban development but the most tangible expression of capitalist dynamics in organizing urban spaces. According to Flavio Villaça (2001) and Roberto Lobato Corrêa (2023), the production of space is not a natural process; it is a social and political construction deeply influenced by power relations and the economic interests of dominant elites.

Urban spaces are shaped to serve the logic of capital, transforming cities into commodities governed by market forces. Villaça (2001) emphasizes that urban space is produced unevenly to maximize exchange value, systematically relegating less valued areas to poorer populations who are excluded from the benefits of urban development. This dynamic not only reflects but also intensifies existing socioeconomic inequalities, creating a cycle of marginalization that persists across generations.

The highlight that urban responses to climate change further intensify socio-spatial segregation. Urban climate governance, often driven by capital interests, creates new forms of exclusion. Central areas develop experimental adaptation projects, while peripheral regions remain vulnerable due to inadequate investment in resilience infrastructure. Consequently, urban climate resilience often accentuates existing disparities, deepening inequalities in access to safer and better-prepared environments (Broto and Bulkeley's, 2012).

David Harvey (2008) argues that socio-spatial segregation is not an accidental byproduct of urban capitalism but a deliberate strategy of control and exploitation. Neoliberalism intensifies this segregation by transforming cities into arenas for capital accumulation. Urban spaces are constantly reshaped by market forces to favor dominant

classes at the expense of vulnerable populations. Real estate speculation and gentrification are clear manifestations of this process, where capital displaces poorer communities from central areas, promotes the privatization of public spaces, and concentrates wealth in exclusive zones. In this scenario, urban space becomes a battleground where the right to the city is usurped by the forces of capital.

Broto and Bulkeley's (2012) observations show that these neoliberal practices infiltrate climate change responses. Technological solutions are implemented in central, financially viable areas, while urban peripheries are neglected in environmental adaptation. Municipal governments, often partnering with private corporations, focus on sectors that maximize economic return, further marginalizing vulnerable territories instead of integrating inclusive resilience solutions.

This process extends beyond physical reorganization; it manifests as structural violence. The territorial exclusion of the working class emerges as a systemic mechanism of oppression continuously reproduced within cities. Milton Santos (2023), analyzing the Latin American context, denounces this exclusion as integral to enclave urbanism, where elites build islands of prosperity surrounded by peripheral poverty.

For Santos (2023), Brazilian cities exemplify the unequal production of space, contrasting the "technical-scientific informational environment" of elites with the "technical environment" of marginalized populations, creating fragmentation and exclusion. Urban peripheries are intentionally kept on development fringes, where living conditions are deliberately precarious, perpetuating cycles of marginalization and socio-environmental vulnerability.

Hunt and Watkiss (2011) complement this analysis by highlighting that climate vulnerability in marginalized urban areas is exacerbated by their inability to cope with environmental risks like floods, heatwaves, and water shortages. Lack of adequate infrastructure, combined with population pressures and state neglect, makes these peripheries epicenters of the climate crisis. Even cities like London and New York, despite leading in adaptation strategies, face challenges in addressing socio-spatial segregation because their responses often reinforce social exclusion due to economic interests.

Mike Davis (2006) argues that socio-spatial segregation reveals the darker side of contemporary urbanism, especially through the lens of climate vulnerability. Global capitalist urbanization produces masses of excluded people confined to slums and informal settlements with precarious living conditions. The uncontrolled growth of these substandard agglomerations, particularly in the Global South, results directly from a neoliberal model that concentrates wealth among a minority while pushing significant populations into unhealthy, environmentally hazardous conditions.

For Davis (2006), urban peripheries become "sacrifice zones," where populations are more vulnerable to climate impacts like floods and heatwaves, with the state failing to provide basic services. Consequently, these peripheries become epicenters of the climate crisis, where socio-spatial segregation amplifies exposure to environmental disasters, perpetuating marginalization and socio-environmental risk.

In this context, the production of urban space becomes a multifaceted form of domination encompassing political and environmental dimensions. Harvey (2008) asserts that socio-spatial segregation is a deliberate strategy to ensure capital reproduction at the expense of vulnerable populations. Central urban areas transform into hubs of consumption and investment, while peripheries are relegated to neglect.

This model deepens the divide between privileged and marginalized zones, resulting in urban configurations that perpetuate inequality and socio-spatial injustice. This dynamic shapes not only the physical morphology of cities but also influences social relations and life opportunities, creating an urban fabric marked by severe socioeconomic and environmental disparities.

Harvey's (1992) concept of spatial justice is central to this debate. He argues that social justice can only be achieved through spatial justice—equitable redistribution of urban space and resources. However, socio-spatial segregation hinders progress toward this goal, as urban space is deliberately designed to maintain inequalities. Practices like gentrification, privatization of public spaces, and displacement of low-income populations to peripheral areas consolidate spatial injustice and reinforce social exclusion (Legroux, 2022).

These dynamics amplify socioeconomic disparities, creating cycles of marginalization increasingly difficult to break as they intertwine with environmental vulnerabilities. In summary, socio-spatial segregation is a concrete manifestation of capitalist accumulation logic, where urban space serves elite interests while economically vulnerable populations are confined to extreme vulnerability.

As demonstrated by Harvey (2008), Villaça (2001), Corrêa (2023), Santos (2023), Davis (2006), and corroborated by Hunt and Watkiss (2011) and Castán Broto and Bulkeley (2012), the production of urban space

is a profoundly unequal process that amplifies social and environmental inequalities. This results in urban configurations where peripheries first suffer climate impacts with limited resistance or adaptation possibilities. Segregation transcends economic inequality, manifesting as structural violence that perpetuates marginalization, while urban centers become enclaves of prosperity for a powerful minority.

This process highlights the limitations of the neoliberal urbanization model, which, instead of promoting inclusive and sustainable cities, reproduces exclusion and precariousness in urban peripheries. It exacerbates socio-environmental vulnerabilities and compromises urban resilience amid contemporary climate challenges.

### **3. Climate Vulnerability in Peripheries: Unequal Effects of Climate Change**

Climate vulnerability in urban peripheries emerges as a clear reflection of the structural inequality defining urban space under capitalism. In this context, economically marginalized populations are disproportionately exposed to environmental risks. Far from being a neutral factor, climate change acts as a catalyst that not only intensifies existing problems in the peripheries but also amplifies spatial segregation by directing the most severe impacts to the most precarious areas.

Mike Davis (2006), in his analysis of global peripheries, highlights that these areas are often marked by inadequate infrastructure, fragile housing, and a lack of proper urban planning. This reality means that populations living in slums and informal settlements are the most susceptible to the devastating effects of extreme climate events, such as floods, landslides, and heatwaves.

The manifestation of socio-spatial inequality becomes evident in the correlation between the geographic location of peripheries and the intensity of environmental risks. Harvey (2008) argues that the neoliberal urbanization model systematically pushes the poorest populations into areas of high environmental vulnerability, such as steep slopes, flood zones, and regions lacking basic infrastructure.

This dynamic is driven by the logic of capital accumulation, which prioritizes real estate speculation in central areas while the state neglects planning and protection in peripheral zones (Legroux, 2022). Consequently, the poor population, already marginalized socially and economically, is doubly vulnerable to climate impacts. This vulnerability is not just about location but also about resources: peripheral populations lack the financial, institutional, and technological means to adapt or resist environmental crises.

The fragility of housing in these areas is a critical element in amplifying climate risks. Milton Santos (2023) explains that unequal urbanization in Brazil has created a scenario where the poor live in territories without any formal structure, residing in homes made of precarious materials, which increases exposure to extreme climate events. Severe storms and floods have devastating effects in these regions, where nonexistent or inadequate infrastructure hinders an effective response to natural disasters. Without access to basic sanitation, drainage, or electricity, residents of the peripheries face a daily deterioration of living conditions. When confronted with climate change, these structural deficiencies become true traps of vulnerability.

Broto and Bulkeley (2012) reinforce this point by discussing how cities often implement climate experiments primarily in wealthier areas with robust infrastructure, neglecting the peripheral regions where vulnerability is greatest. These urban experiments in resilience tend to focus on technical and infrastructural innovations in central areas, further deepening the divide between the urban core and the peripheries. The peripheries, therefore, remain excluded from adaptation measures, while central regions benefit from sustainability initiatives, thus perpetuating the marginalization of already vulnerable populations.

Corrêa (2023), in discussing the production of space, argues that urban planning under capitalism is structured to perpetuate the marginalization of poor populations. Climate change intensifies this marginalization by turning neglected areas into constant risk zones. The state, prioritizing the interests of capital and real estate speculation, fails to implement public policies capable of mitigating the effects of climate disasters in the peripheries, creating a situation of abandonment and climate injustice. Simultaneously, large investments in infrastructure and sustainability in central areas contribute to an increasingly unequal urban geography, where protection against the effects of climate change is an exclusive privilege of the middle and upper classes.

The analysis of Hunt and Watkiss (2011) complements this argument, pointing out that urban planning in wealthy areas of cities like London and New York incorporates climate resilience through advanced infrastructure and early warning systems, while peripheral areas, especially in developing countries, remain highly vulnerable. Their research highlights that the concentration of adaptation resources in central areas, driven by financial interests, leaves peripheral populations exposed to disproportionate risks, without the means to recover from or resist climate-related disasters.

These aspects underscore the importance of pursuing climate justice, which should be understood as a central

issue in addressing extreme events. As Mike Davis (2006) observes, global urban peripheries are zones of high vulnerability within the context of the climate crisis, where populations are forced to deal with the most severe impacts of environmental disasters without the necessary state protection. These populations, historically excluded from urban and environmental decision-making processes, have contributed the least to global warming but suffer the most from its consequences. This constitutes a cycle of structural injustice in which the poor pay the price for the actions of urban and global elites.

The concept of climate justice, as also emphasized by Broto and Bulkeley (2012), stresses the need for inclusive strategies that consider the unequal distribution of environmental risks. In their study, they advocate for policies that address the systemic exclusion of marginalized populations from climate resilience initiatives, pointing out that only through equitable urban governance can cities effectively confront the climate crisis.

Thus, the spatial segregation of peripheral populations places them at the epicenter of the impacts of climate change, while urban elites remain protected by modern, well-planned infrastructure. In many instances, the fragility of housing, the lack of essential services, and the neglect of public policies turn extreme climate events into humanitarian catastrophes that further deepen socio-spatial inequality. As Harvey (2008) aptly noted, climate change is not an external event to the city; it is part of an urban system that feeds on inequalities to perpetuate the marginalization of the most vulnerable populations.

#### **4. Critical Analysis: Public Policies and Urban Planning in the Climatic Era**

Urban public policies in Brazil reflect a planning paradigm that paradoxically exacerbates socio-spatial inequalities and amplifies the vulnerability of peripheral areas to the effects of climate change. David Harvey (2008), in his critique of urban neoliberalism, argues that this model favors capital accumulation through urban interventions focused on real estate valorization, to the detriment of the needs of marginalized populations. In the Brazilian context, this dynamic is particularly evident in projects aimed at revitalizing central areas, conceived primarily to attract investments and promote tourism, while peripheral regions—where climatic impacts are more severe—remain devoid of significant investments in climate adaptation infrastructure.

A notable example of this logic is the revitalization project of Faria Lima Avenue in São Paulo, one of the country's largest financial hubs. In recent decades, the region has received substantial investments for modernization, aiming to attract multinational companies and foreign investments. The requalification of the area included improvements in urban mobility and the creation of public spaces, always oriented toward a corporate and high-income audience (Reis, Vêras, 2024).

In contrast, peripheral areas such as the East and South Zones, where the effects of climate change are more intense, have continued without adequate structural actions to mitigate floods, landslides, and heatwaves. These areas, particularly vulnerable to seasonal flooding, suffer from a lack of preventive urban planning, putting the lives and properties of residents at risk during periods of intense rainfall.

In this sense, Jabareen (2013) emphasizes that cities, especially those in the Global South, fail to integrate sustainable planning approaches into the most vulnerable areas, perpetuating climate exclusion. He argues that the absence of adequate infrastructure in peripheral regions, such as efficient drainage systems, reflects a governance deficit and a lack of integrated public policies. This aggravates the exposure of low-income populations to environmental risks, exacerbating socio-spatial inequalities in cities like São Paulo and Rio de Janeiro.

Milton Santos (2023) emphasizes that Brazilian urbanization, shaped by a logic of exclusion, confines poor populations to environmentally degraded territories without access to quality infrastructure. The East Zone of São Paulo exemplifies this phenomenon, being one of the areas most affected by recurring floods due to its proximity to rivers and floodplains (Oliveira, 2016).

Neighborhoods like Itaquera, Vila Prudente, and São Miguel Paulista regularly suffer from floods caused by rampant soil impermeabilization and inadequate drainage systems. Although these are densely populated regions with high social vulnerability, public policies focused on the environmental infrastructure of these areas are limited. The Alto Tietê River Macro-Drainage Plan, created to minimize the impacts of floods, failed to keep pace with disorderly growth and the lack of maintenance of drainage systems, leaving thousands of families at the mercy of seasonal flooding (Fabhat, 2016).

The implementation of “sustainable” projects in more centralized areas also demonstrates how the concept of sustainability has often been co-opted and instrumentalized as an urban marketing tool, primarily aiming to attract investments rather than providing effective responses to pressing socio-environmental challenges in peripheral regions. Corrêa (2023) argues that urban space is shaped by market forces to meet the demands of

capital—a dynamic paradigmatically manifested in selective urban interventions.

Tyler and Moench (2012) reinforce that climate resilience strategies in global cities often neglect the most vulnerable areas, focusing on technically sophisticated projects in urban centers. They suggest that these initiatives are driven by economic and political interests that favor the urban elite, leaving peripheral regions devoid of investments and effective climate adaptation. By failing to address the structural vulnerabilities of these areas, urban policies end up deepening existing inequalities.

Augusta Park in São Paulo emerges as an emblematic example of this logic. Situated between high-income neighborhoods such as Higienópolis and Consolação, the park was promoted as a green project geared toward urban sustainability (Politi; Abascal, 2022). However, a critical analysis reveals that its social and environmental impact is limited, as its primary function appears to be the real estate appreciation of the region, benefiting a small urban elite. This contrast becomes even more acute when considering the reality of peripheral neighborhoods like Grajaú and Capão Redondo, where public spaces are scarce, and the prevalence of informal housing indicates a profound inequality in the distribution of urban resources and investments. This disparity in the allocation of "sustainable" projects not only perpetuates but also amplifies socio-environmental vulnerabilities in peripheral areas, evidencing how current urban policies, under the guise of sustainability, can paradoxically exacerbate spatial inequities and differential exposure to climate risks.

The vulnerability of Brazilian favelas also illustrates the inability of public policies to address the effects of climate change in high-risk areas. Mike Davis (2006) discusses how cities in the Global South, such as Rio de Janeiro, fail to protect their poorest populations, who live in precarious conditions and zones vulnerable to climatic disasters. In Rio de Janeiro, communities such as Morro da Providência and Complexo do Alemão are frequently impacted by landslides and floods during periods of heavy rainfall (Rodrigues, 2016). The fragility of these areas is exacerbated by insufficient preventive policies and the precariousness of housing, often constructed improvisationally on steep slopes. Instead of preventive actions, such as implementing drainage systems and reinforcing buildings, the public authorities' response is reactive and emergency-based, often limited to the temporary removal of families without offering permanent solutions.

The removal of communities in the name of large urban development projects is another form of marginalization associated with public policies. During the preparations for the 2016 Olympic Games in Rio de Janeiro, the community of Vila Autódromo was partially removed to make way for the Barra Olympic Park (Comitê Popular da Copa e Olimpíadas do Rio de Janeiro, 2014). Citing reasons of security and sustainability, the government relocated hundreds of families to even more peripheral areas without providing adequate infrastructure conditions. Vila Autódromo, located in a valued area of the city, was sacrificed to attract international investments and reinforce the image of urban modernization. Meanwhile, the peripheral areas where the families were relocated remained devoid of adequate policies to confront climatic challenges, aggravating existing situations of socio-environmental vulnerability.

Rosenzweig et al. (2011) argue that public policies that neglect peripheral areas reflect a systemic failure in urban planning. They highlight that climate adaptation strategies in cities like New York and London have disproportionately favored wealthier areas, showing a global pattern of neglect toward the peripheries. This climate exclusion worsens social and environmental vulnerabilities, resulting in unequal adaptation to climate risks.

These examples highlight how public policies in Brazil, by promoting an urbanism model focused on capital accumulation and real estate appreciation in central areas, neglect the peripheries that suffer the most from the impacts of climate change. The lack of investments in adequate infrastructure to mitigate floods and landslides, combined with the forced removal of populations in the name of large projects, reveals a pattern of exclusion that perpetuates the vulnerability of the poorest populations. The urbanism practiced in much of Brazil prioritizes economic interests and overlooks the issue of climate justice, exacerbating socio-spatial inequalities and environmental risks in peripheral areas.

Meerow et al. (2016) conclude that urban resilience will only be effective if implemented equitably, involving the most vulnerable populations in planning processes and resource allocation. They warn that without an inclusive approach, urban strategies will continue to perpetuate climate inequalities, resulting in cities increasingly divided between protected areas and those exposed to environmental risks.

In summary, urban public policies in Brazil, driven by neoliberal interests, are systematically structured to deepen socio-spatial inequalities. The focus on real estate development in central areas, the selective implementation of "sustainable" projects, and the lack of comprehensive infrastructure in peripheral regions collectively create a scenario in which the most vulnerable populations are continually marginalized. This

exclusionary approach exacerbates both social and environmental vulnerabilities, leaving peripheral communities at heightened risk of climate disasters. Effective climate adaptation strategies must prioritize these marginalized areas, ensuring that urban planning not only promotes economic growth but also addresses the pressing issues of climate justice and socio-environmental resilience.

### **5. Perspectives of Climate Justice and Equitable Urbanism**

Achieving climate justice requires a profound reformulation of urban policies, with a prioritized focus on the structural inequalities that make certain population segments more vulnerable to the effects of climate change. Cities, especially in the context of the Global South, as highlighted by David Harvey (2008), are conceived and managed under a logic that prioritizes capital maximization, resulting in a disproportionate concentration of investments in central areas to the detriment of peripheral ones. This urban model, aligned with neoliberal precepts, not only perpetuates but also exacerbates socio-spatial disparities, excluding marginalized populations from climate solutions. The climate justice perspective, therefore, requires urban planning to incorporate equity as a central principle, ensuring that the most vulnerable are not the most impacted by extreme climate events.

Jabareen (2013) complements this analysis by arguing that urban climate justice must involve a reassessment of governance practices to ensure that peripheral populations, often excluded, are integrated into climate adaptation policies. He emphasizes that solutions for urban resilience need to be inclusive, addressing the specific needs of the most vulnerable areas rather than adopting generic approaches that favor the economic interests of central regions. Meerow et al. (2016) support this view, stating that urban resilience can only be effective if it directly involves vulnerable communities, allowing them not only to benefit from urban policies but also to participate in their formulation.

In Brazil, where peripheral populations live in extremely precarious conditions, it is essential to implement climate adaptation policies that prioritize these areas. Peripheral neighborhoods in São Paulo, such as Grajaú and São Mateus, face floods and landslides every rainy season. The absence of adequate infrastructure, such as drainage systems, reveals the historical lack of investments in these regions. Hunt and Watkiss (2011) highlight that the lack of integrated planning in urban peripheries directly contributes to climate vulnerability, exacerbating the environmental impacts on these already socially marginalized populations. According to Milton Santos (2023), these areas are deliberately left on the margins of urban development, which amplifies the risks. In his studies, Santos criticizes the notion that urbanism is neutral, demonstrating how planning serves the interests of elites while neglecting the fundamental rights of peripheral populations.

A climate justice approach implies not only redistributing resources but also reversing the logic of exclusion in urban policies. Henri Lefebvre (2009) advocates for the "right to the city," arguing that marginalized populations should have the power to influence decisions that affect their territories. In the context of climate change, this means that the most affected communities must be actively included in urban planning and climate adaptation processes. Instead of applying generic solutions that often benefit central areas and real estate interests, public policies need to be shaped to meet the specific needs of high-risk areas. Tyler and Moench (2012) reinforce this idea by emphasizing the importance of the active participation of vulnerable communities in all stages of policy formulation, especially in terms of urban resilience and climate adaptation. They argue that without an inclusive and participatory focus, resilience policies will continue to reinforce pre-existing structural inequalities.

The adoption of emergency policies after climate disasters—a recurring practice in the Brazilian context—proves insufficient and symptomatic of a reactive approach that fails to address the structural causes of urban vulnerability. Contrasting this model, it is imperative to conceive and implement equitable urbanism based on the construction of resilient cities, where historically vulnerable areas are proactively prepared to face the multifaceted challenges imposed by climate change. Mike Davis (2006), in his critical analysis of Global South cities' responses to climate crises, emphasizes the belated and palliative nature of governmental interventions, which prioritize reactive measures over structural policies capable of mitigating future risks and promoting sustainable urban resilience. Rosenzweig et al. (2011) also highlight that the implementation of structural measures focused on climate resilience in the most vulnerable areas can mitigate the impacts of extreme climate events and reduce urban inequalities.

Climate justice goes beyond adapting to extreme climate events; it constitutes an ethical imperative that demands a restructuring of urban priorities to ensure that historically neglected areas receive priority investments. Projects like the Tietê Linear Park, designed to mitigate the impacts of floods in São Paulo, exemplify urban interventions with transformative potential and should be replicated and expanded to regions like the East Zone, where soil impermeabilization has caused catastrophic flooding (Peixoto, 2010). However, these projects are often directed toward more central areas, leaving the peripheries out of structural solutions, highlighting the urgent need for a

critical and comprehensive review of current urban planning practices.

Stephen Tyler and Marcus Moench (2012) reinforce the need for an integrated and equitable approach to formulating urban climate resilience policies. They argue that, to achieve climate justice, it is necessary to ensure that infrastructure interventions are implemented in the most vulnerable areas, with an equitable distribution of public resources and the active involvement of local communities. Furthermore, the authors advocate that the creation of collaborative networks between the public and private sectors and civil society organizations can promote a more effective response to the climate challenges facing cities.

In this context, the implementation of equitable urbanism based on the principles of climate justice must be articulated along three fundamental and interdependent axes:

1. Implement resilient infrastructure policies in the most vulnerable areas.
2. Ensure community participation in the decision-making process.
3. Direct public resources equitably, correcting historical investment failures in the peripheries.

These actions are essential to break the pernicious cycle of socio-spatial exclusion and enable cities to adapt to climate change more justly and sustainably. Milton Santos (2023), suggest that climate justice should be viewed as a continuous process, requiring both the redistribution of resources and the transformation of power relations within cities. They argue that true urban resilience can only be achieved when the most vulnerable are at the center of urban decisions and investments.

The implementation of this equitable and climate-just urbanism model requires a profound reconfiguration of urban governance structures, resource allocation mechanisms, and processes for planning and managing urban space. Castán Broto and Bulkeley (2012) point out that such transformation requires not only technical and political innovations but also a paradigmatic shift in how we conceive and value the different spaces and communities that compose the urban fabric. Jabareen (2013) complements this by asserting that climate justice will only be possible through the integration of various stakeholders and the reformulation of decision-making processes, incorporating the perspectives of vulnerable populations that have historically been neglected.

## 6. Final Considerations

An in-depth analysis of socio-spatial segregation and climatic vulnerability in urban peripheries reveals a dynamic of exclusion deeply rooted in Brazilian urban policies, evidencing a logic that prioritizes capital accumulation over the most vulnerable populations. The unequal production of urban space, as argued by Lefebvre (2009), transcends the mere reflection of a wealth accumulation logic, constituting a structural form of violence that systematically relegates the poorest segments of society to environmentally degraded and high-risk areas. In this scenario, climate change emerges as a catalyst that intensifies this marginalization, exposing peripheral populations to disproportionate risks without adequate public policies being implemented to mitigate such effects.

The climatic vulnerability of the peripheries, as pointed out by Davis (2006), is a direct consequence of an urban model that neglects the needs of marginalized populations, prioritizing investments in central areas where protection against environmental disasters is guaranteed. Conversely, peripheral regions are relegated to precariousness, with fragile housing and a lack of basic infrastructure, aggravating the impacts of climatic disasters like floods and landslides.

However, the Brazilian urban scenario reflects this exclusionary logic by promoting large revitalization projects in central areas, while the peripheries remain devoid of structuring policies capable of mitigating their socio-environmental vulnerability. This disparity in resource allocation and governmental attention perpetuates and deepens socio-spatial inequalities, creating a vicious cycle of vulnerability and exclusion.

In light of this panorama, climate justice must be established as the central axis of any equitable urbanism proposal. The implementation of a new urban paradigm requires:

1. Strategic redistribution of investments to the most vulnerable areas, prioritizing resilient and adaptive infrastructure.
2. Effective and meaningful inclusion of peripheral communities in decision-making processes, valuing local knowledge and lived experiences.
3. Implementation of resilient infrastructures in the peripheries, capable of mitigating climatic impacts and improving residents' quality of life.
4. Development of housing policies that consider not only the provision of housing but also their location in



safe areas well-served by urban infrastructure.

5. Integration of climate adaptation strategies into urban planning at all scales, from the local to the metropolitan level.

As Santos (2023) emphasizes, there is no urban justice without equity in access to resources and environmental protection. This equity will only be achieved through a structural transformation in public policies aimed at promoting truly inclusive and sustainable cities.

Such transformation demands not only a reorientation of investments but also a paradigmatic change in the conception and management of urban space, recognizing the interdependence between social justice, environmental sustainability, and climatic resilience.

#### **Informed consent**

Obtained.

#### **Ethics approval**

The Publication Ethics Committee of the Canadian Center of Science and Education.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

#### **Data sharing statement**

No additional data are available.

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