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ALÉM DA MITIGAÇÃO: QUILOMBOLAS COMO COMUNIDADES EPISTÊMICAS NA CRISE CLIMÁTICA

MÁS ALLÁ DE LA MITIGACIÓN: QUILOMBOLAS COMO COMUNIDADES EPISTÉMICAS EN LA CRISIS CLIMÁTICA

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ABSTRACT: The climate crisis has deepened socio-environmental inequalities in Brazil, disproportionately affecting vulnerable communities such as the quilombolas. This study analyzes these inequalities through the concepts of climate justice and environmental racism, using the 2024 climate disaster in Rio Grande do Sul as a reference. In addition to examining the impacts on quilombola communities, this research positions climate justice as a field of political and epistemological dispute, highlighting the contributions of decolonial approaches and social sciences to a critical understanding of the environmental crisis. It argues that strengthening participatory policies and valuing traditional knowledge are essential to addressing the challenges posed by climate change.

KEYWORDS: Climate justice. Environmental racism. Socio-environmental vulnerability. Risk perception. Quilombola communities.

***RESUMO**: A crise climática tem aprofundado desigualdades socioambientais no Brasil, afetando de forma desproporcional comunidades vulneráveis, como as quilombolas. Este estudo analisa essas desigualdades a partir dos conceitos de justiça climática e racismo ambiental, tomando como referência o desastre climático ocorrido no Rio Grande do Sul em 2024. Além de examinar os impactos sobre as comunidades quilombolas, a pesquisa insere a justiça climática como um campo de disputa política e epistemológica, ressaltando as contribuições da abordagem decolonial e das ciências sociais para uma compreensão crítica da crise socioambiental. Argumenta-se que o fortalecimento de políticas participativas e a valorização dos saberes tradicionais são fundamentais para enfrentar os desafios impostos pelas mudanças climáticas.*

***PALAVRAS-CHAVE**: Justiça climática. Racismo ambiental. Vulnerabilidade socioambiental. Percepção de risco. Comunidades quilombolas.*

***RESUMEN**: La crisis climática ha profundizado las desigualdades socioambientales en Brasil, afectando de manera desproporcionada a comunidades vulnerables, como los quilombolas. Este estudio analiza estas desigualdades a partir de los conceptos de justicia climática y racismo ambiental, tomando como referencia el desastre climático ocurrido en Rio Grande do Sul en 2024. Además de examinar los impactos sobre las comunidades quilombolas, la investigación posiciona la justicia climática como un campo de disputa política y epistemológica, resaltando las contribuciones del enfoque decolonial y de las ciencias sociales para una comprensión crítica de la crisis ambiental. Se argumenta que el fortalecimiento de políticas participativas y la valorización de los saberes tradicionales son fundamentales para enfrentar los desafíos que impone el cambio climático.*

***PALABRAS CLAVE**: Justicia climática. Racismo ambiental. Vulnerabilidad socioambiental. Percepción de riesgo. Comunidades quilombolas.*

Introduction

The climate crisis is an undeniable reality, widely documented by studies and reports of the Intergovernmental Panel on Climate Change (IPCC). In recent decades, the social sciences have increasingly engaged in debates on this issue, offering essential contributions to understanding socioenvironmental inequalities. The impacts of extreme climate events are not distributed evenly, disproportionately affecting the most vulnerable populations, such as Indigenous peoples, quilombola communities, and peripheral urban populations. The term *climate justice* has been used to describe this context in which preexisting inequalities and vulnerabilities—historically and structurally inherited from the slave-based and colonial system—are exacerbated by the consequences of climate events.

Within this context, this study, based on a literature review and documentary analysis of national and international reports, investigates environmental inequalities in Brazil through the lenses of climate justice and environmental racism. Taking the climate disaster that occurred in Rio Grande do Sul in 2024 as a point of reference, the study analyzes how the socioenvironmental crisis affects quilombola communities, seeking to provide a general understanding of its impacts and risk perceptions. The research is guided by the following questions: how can the impacts of climate disasters on vulnerable communities, such as quilombola groups, be addressed without resorting to technicist and top-down solutions? How can participatory responses be built with and for the affected populations? Based on these reflections, the study emphasizes the importance of considering community risk perceptions in public policy formulation and of valuing traditional knowledge, which is fundamental to addressing the emerging socioenvironmental crisis.

The socioenvironmental crisis and global inequality

The socioenvironmental crisis gained international recognition in the 1990s, driven by major global events such as the Brundtland Report (*Our Common Future*) (United Nations [UN], 1987) and the Rio Earth Summit (ECO-92) held in Rio de Janeiro. However, warnings about environmental degradation and its impacts had already been raised since the late 1960s by environmental movements in various countries and by the Club of Rome. These environmental problems, combined with unresolved social issues—and in some cases intensified by the relentless pursuit of increased productivity and profits in previous decades, such as hunger, poverty, and social inequalities, especially in countries of the Global South—

contributed to shaping a multidimensional socioenvironmental crisis with global reach (Morin; Kern, 2003; Veiga, 2005; Ngcamu, 2023; Rosa; Fleury, 2024).

The perception of an intensifying socioenvironmental crisis gained further momentum through critical assessments highlighting the limited effectiveness of global action plans developed up to that point, such as Agenda 21 and the Millennium Development Goals (MDGs). In response to these shortcomings, the UN revised its guidelines in 2015 by launching the 2030 Agenda, which introduced the Sustainable Development Goals (SDGs), including SDG 13, aimed at strengthening mitigation and adaptation strategies to climate change (UN, 2015). Nevertheless, recent studies show that energy transition strategies remain largely ineffective and continue to reinforce global inequalities (Hickel et al., 2022; Calzadilla, 2024). As global interconnections deepen and climate change intensifies, socioenvironmental impacts have become increasingly visible and widely debated.

The destruction of tropical forests, rising greenhouse gas emissions, global warming, prolonged droughts, floods, species extinction, freshwater scarcity, ocean acidification, and the erosion of arable soils are widely documented and studied phenomena. Together, they reinforce the scientific perception of a continuously intensifying socioenvironmental crisis, culminating in the global recognition of a climate crisis scenario. This context is characterized by the transgression of planetary boundaries that sustain life as we know it, as anthropogenic influence has altered the Earth's surface, subsurface, and biogeochemical systems, severely affecting the planet's critical life-support systems. This recognition has broadened the debate on the crisis, highlighting both local challenges and the global implications of this multidimensional phenomenon (Agrawal, 2005; Danowski; Castro, 2014; Hickel *et al*., 2022).

More recently, the report *The 2024 State of the Climate Report: Perilous Times on Planet Earth* (Ripple *et al*., 2024) described the current situation as one of imminent climate catastrophe and social collapse. The report documents recurring climate disasters in recent years—such as extreme heatwaves, floods, and wildfires—which directly result from global warming and the intensification of extreme climate conditions. As environmental and climatic deterioration pushes societies beyond their resilience thresholds, the world moves closer to social collapse due to the intersection of economic inequalities, resource depletion, and the catastrophic impacts of climate change.

Despite growing awareness of this urgent and multiple—perhaps irreversible—crisis in recent years, greenhouse gas (GHG) emissions have continued to rise. According to the IPCC report (2022), approximately 3.5 billion people are highly vulnerable to climate change,

particularly in regions of the Global South such as Africa, Asia, and Latin America, where mortality from climate-related disasters is 15 times higher. Although the consequences of emissions are global in scope, they are especially severe in the Global South, even though countries in the Global North have historically contributed a larger share of emissions and are generally less vulnerable to climate impacts[5]. In this context, inequality emerges as a fundamental factor for understanding the socioenvironmental crisis, in which the capitalist system has played a central role both in increasing GHG emissions and in deepening the vulnerability of social groups to climate change.

A report by the Climate and Health Observatory[6] highlighted that, in Brazil, droughts, dry spells, floods, landslides, and strong winds are the main climate-related disasters. The Observatory emphasized that emergencies are generally associated with rainfall and its consequences, such as landslides, flash floods, and inundations. Flooding, in particular, has caused extensive material, immaterial, and health-related damage due to the spread of diseases such as leptospirosis, contamination of water and food supplies, and the proliferation of venomous animals. Forced displacement caused by flooding also facilitates the spread of communicable diseases due to overcrowding in temporary shelters and has significant impacts on the mental health of affected populations. These effects were evident in the tragic floods that struck Rio Grande do Sul in the first half of 2024 (Fundação Oswaldo Cruz [Fiocruz]; Instituto Nacional de Pesquisas Espaciais [INPE], 2011; Rizzotto; Costa; Lobato, 2024).

Climate disasters in Brazil: the case of Rio Grande do Sul

Rio Grande do Sul has experienced a significant increase in the frequency and intensity of climate disasters, ranging from prolonged droughts to floods, driven by natural factors and exacerbated by global climate change. The alternation between drought periods and floods has created a climate of extremes, in which regions that faced water scarcity in one year were inundated the next, suffering both from shortages of drinking water and severe impacts on local

[5] OUR WORLD IN DATA. Co-emissões per capita. Available at:https://ourworldindata.org/grapher/co-emissions-per-capita?time=latest. Accessed in: 28 Oct. 2024.

[6] FUNDAÇÃO OSWALDO CRUZ. Instituto Nacional de Pesquisas Espaciais. Ministério da Saúde. **Relatório sobre extremos climáticos**. Rio de Janeiro: Fiocruz, 2011. Available at:http://www.climasaude.icict.fiocruz.br/temas/relatorio_extremos.pdf. Accessed in: 24 Oct. 2024.

economies, particularly agriculture and livestock production[7]. Since the 1990s, more than 3,000 hydrological disasters have been recorded in the state, with floods affecting nearly its entire territory[8]. The climate disaster of historic proportions that occurred in May 2024 underscored the urgency of adaptation and mitigation measures. Intense rainfall that began on April 27 persisted for ten consecutive days, affecting the Taquari, Caí, Pardo, Jacuí, Sinos, and Gravataí river basins, which overflowed and impacted the cities of Santa Maria, Porto Alegre, Pelotas, and Rio Grande[9]. According to Civil Defense authorities, 478 of the 497 municipalities in the state were directly affected, covering 96.18% of the territory and impacting approximately 2.4 million people, of whom 388,781 were displaced, 183 died, and 27 were reported missing[10].

At that time, entire neighborhoods were submerged, leading to the displacement of thousands of people to shelters, in addition to extensive material losses. Due to damage to service infrastructure, most municipalities in Rio Grande do Sul experienced interruptions in water supply, electricity, and telecommunications services. Regarding road infrastructure, 14 bridges collapsed and more than 13,000 kilometers of highways were damaged[11], leaving widespread destruction. Furthermore, a 0.3% decline in Gross Domestic Product (GDP) was recorded in the second quarter of 2024 compared to the previous quarter, signaling the significant impacts of the socio-climatic disaster on the economy[12].

In view of the scenario that emerged after the disaster and within the context of a multidimensional socioenvironmental crisis, the need for coordinated actions capable of understanding the scope of physical and social risks became evident, with an emphasis on realistic and non-salvationalist measures (Hübner; Froehlich, 2021). Valencio (2014, p. 3632)

[7] SOUZA, Vivian. “Apagou os planos das nossas vidas”: como clima extremo forçou produtores gaúchos a abandonarem o campo. **G1**, 2024. Available at:https://g1.globo.com/economia/agronegocios/noticia/2024/10/13/apagou-os-planos-das-nossas-vidas-como-clima-extremo-forcou-produtores-gauchos-a-abandonarem-o-campo.ghtml. Accessed in: 6 Nov. 2024.

[8] RIBEIRO, Amanda. Cinco gráficos sobre o desastre climático no Rio Grande do Sul. **Aos Fatos**, 2024. Disponível em: https://www.aosfatos.org/noticias/cinco-graficos-desastre-climatico-no-rio-grande-do-sul/. Accessed in: 28 Oct. 2024.

[9] UM MÊS de enchentes no RS: veja cronologia do desastre. **G1**, 2024. Disponível em: https://g1.globo.com/rs/rio-grande-do-sul/noticia/2024/05/29/um-mes-de-enchentes-no-rs-veja-cronologia-do-desastre.ghtml. Accessed in: 28 Oct. 2024.

[10] BALANÇO das Enchentes no RS. **SOS Enchentes**, 2025. Available at:https://sosenchentes.rs.gov.br/situacao-nos-municipios. Accessed in: 29 Oct. 2024.

[11] TRINDADE, Pedro *et al*. Antes e depois: seis meses após cheias no RS, veja como estavam e como estão lugares atingidos. **G1**, 2024. Available at:https://g1.globo.com/rs/rio-grande-do-sul/noticia/2024/11/04/antes-e-depois-seis-meses-apos-cheias-no-rs-veja-como-estavam-e-como-estao-lugares-atingidos.ghtml. Accessed in: 04 Nov. 2024.

[12] COM impacto dos eventos meteorológicos, PIB do RS recua 0,3% no 2º trimestre em relação ao 1º trimestre de 2024. **Governo do Estado do Rio Grande do Sul**, 2024. Available at:https://www.estado.rs.gov.br/com-impacto-dos-eventos-meteorologicos-pib-do-rs-recua-0-3-no-2-trimestre-em-relacao-ao-1-trimestre-de-2024. Accessed in: 4 Nov. 2024.

observes that the technicist approach often adopted by state institutions in disaster contexts—one that prioritizes instrumental rationality with an exclusive focus on physical dimensions—tends to overlook the multidimensional nature of social suffering in vulnerable communities. Public policies grounded in this technocratic approach reinforce unequal power relations, imposing uncritical compliance by communities with institutional directives. The author argues that a dialogical approach in disaster contexts, beyond being ethical, must be communicative, recognizing and incorporating community-based strategies for risk reduction.

Within this framework, it is acknowledged that multiple crises overlap and mutually reinforce the problems associated with them, whether natural, biological, or social in nature. On the one hand, extreme climatic events generate material and economic losses; on the other, they can negatively affect the health, social life, and psychological well-being of affected populations. Studies in the Sociology of Disasters indicate that the definition of disaster goes beyond physical aspects, encompassing meaning-making processes and socially constructed perceptions of risk. Schons (2021, p. 62), drawing on Stallings (1994), emphasizes that disasters, although materializing as natural phenomena, become social problems through the articulation of public awareness, institutional recognition, and information production.

The socioenvironmental approach recognizes that the social and environmental dimensions of risk are interrelated, especially in contexts where vulnerable populations occupy environmentally sensitive areas. Risk perception is a concept that has evolved over time, encompassing multiple dimensions. In general terms, it refers to how people understand and respond to the hazards that surround them. Contemporary definitions include aspects such as probability, magnitude, and uncertainty regarding adverse events, which may result from natural phenomena or human activities. The notion of risk, as proposed by Beck (2010), suggests that risks are global and affect individuals regardless of social class, while also possessing a local dimension, insofar as extreme climatic events directly and differentially impact specific places and communities. Risk perception also involves the interaction between threat and vulnerability and constitutes a core component in defining exposure to danger. This understanding aligns with the view of the environment as a space of social tensions, in which disputes over the appropriation and use of natural space reflect social cleavages (Suertegaray, 2017; Souza, 2019).

Beyond physical and natural factors, the way people experience their environments influences their perception of risk and determines the limits of behavioral change in the face of threats (Moraes & Souza, 2021). In this context, extreme events may be perceived differently

depending on the communicative capacity of the actors involved. The media, governmental institutions, and the scientific community play central roles in negotiating these perceptions, making risk perception a process that is "symbolically created and socially interpreted" (Schons, 2021, p. 13, our translation). With specific regard to climate change, the social construction of risk is also influenced by climate projections, the behavior of individuals and institutions, and institutional interests that legitimize responses to risk (Yearley, 2009). Awareness of these risks is amplified by the dissemination of scientific reports—such as those produced by the Intergovernmental Panel on Climate Change (IPCC)—and by the lived experience of the consequences of the marked increase in the frequency and intensity of climate-related disasters, as exemplified by the May 2024 event in Rio Grande do Sul.

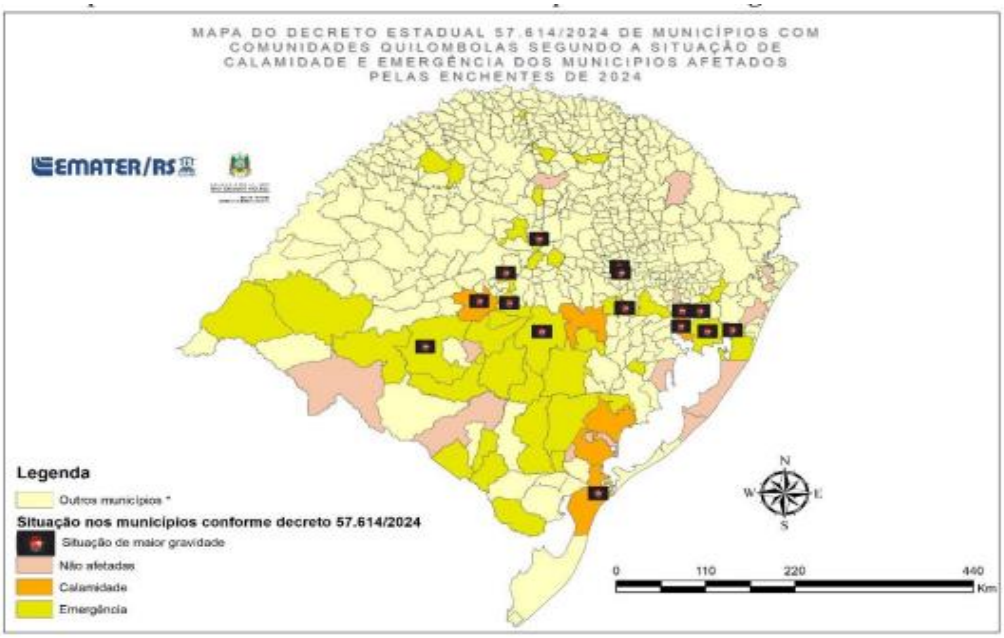
Socioenvironmental vulnerability of quilombola communities

Within this context, from a decolonial and intercultural recognition perspective[13] (Quijano, 2011; Maldonado-Torres, 2007; Escobar, 2010), traditional and quilombola communities can be understood as epistemic communities, producing and mediating knowledge about disasters through their risk perceptions. For these perceptions to be effectively incorporated into public policies, it is essential to give visibility to the narratives and meanings produced from these communities' lived experiences within their territories. Such recognition contributes to the formulation of reconstruction policies that are more closely aligned with their perspectives and demands, underscoring the need for approaches that value local knowledge in responding to the socioenvironmental crisis. Thus, reflecting on disaster impacts through the lens of risk perception can broaden the analysis of climate-related disasters, such as the one that occurred in May 2024 in Rio Grande do Sul. According to the *Report on Socioclimatic Impacts on Quilombola Communities*[14], prepared by EMATER/RS, 90.1% of certified quilombola communities in Rio Grande do Sul are located in municipalities that declared a state of calamity (25.5%) or emergency (64.5%) during the May 2024 event, as illustrated in the map below.

[13] The concept of interculturality refers to the fruitful and mutually enriching dialogue between diverse cultures, which is established under conditions or in the pursuit of symmetry, even when marked by conflicts and power relations. This evolving notion seeks to overcome conflicts, discrimination, and exclusion in Latin America, especially among traditional peoples and communities within societies and states, through practices such as mutual recognition, the exchange of knowledge and experiences, and social coexistence (Salinas; Núñez, 2014).

[14] RIO GRANDE DO SUL (Estado). EMATER. Associação Sulina de Crédito e Assistência Rural. **Relatório de impactos socioclimáticos aos quilombolas**. Porto Alegre: SDR, 2024. Available at:https://sdr.rs.gov.br/upload/arquivos/202406/14180334-14-06-get-relatorio-perdas-quilombolas-maio-2024.pdf. Accessed in: 24 Oct. 2024.

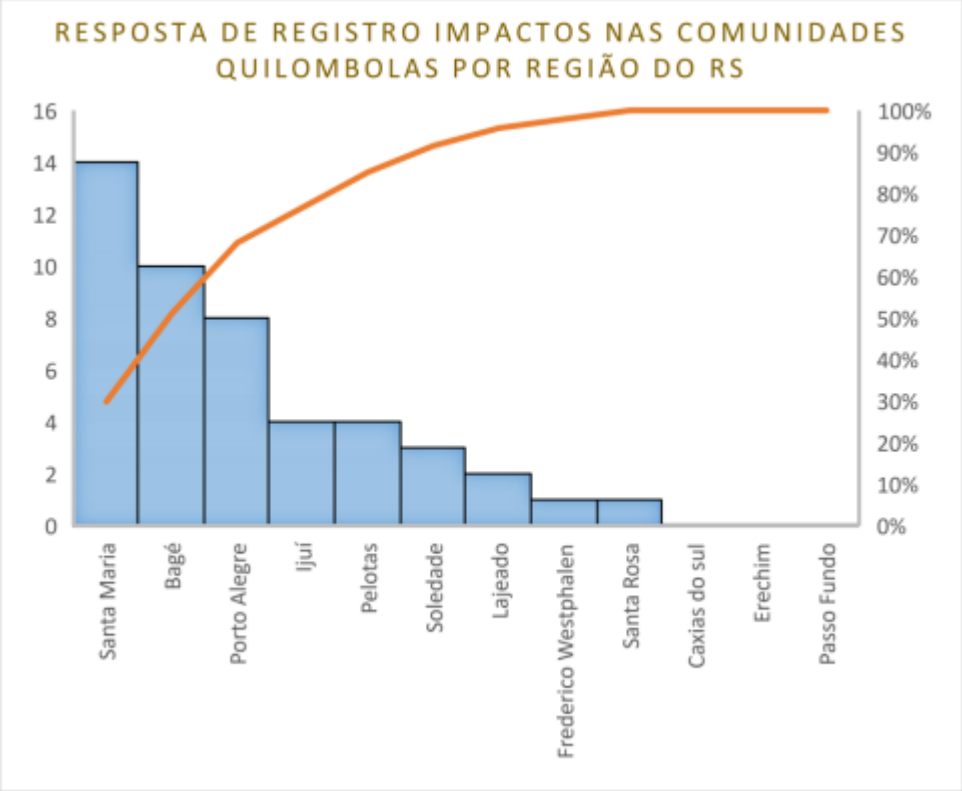
Figure 1 – Map of Rio Grande do Sul and municipalities with affected quilombola communities



Source: Report on Socioclimatic Impacts on Quilombola Communities (2024).

The report further indicates that the quilombola communities most severely affected are located in municipalities that declared states of emergency or public calamity, particularly in the major regions of Santa Maria, Bagé, and Porto Alegre, as shown on the map.

Figure 2 – Reported impact responses in quilombola communities by region in Rio Grande do Sul



Source: *Report on Socioclimatic Impacts on Quilombola Communities* (2024).

In the central region of the state, the most affected municipalities were Agudo, Dona Francisca, and Santa Maria. The report categorizes communities into two axes: the first includes those that, despite being located in severely affected municipalities, were indirectly impacted; the second refers to municipalities with the highest concentration of quilombola families directly affected. In the municipalities where communities were directly impacted, 300 families were displaced and 342 experienced various forms of damage. These data suggest that all communities were affected in some way, both at the economic level—with losses to subsistence production and/or commercialization and damage to collective infrastructure—and at the social and cultural levels. The report compiles relevant information regarding the extent of damage suffered by quilombola communities in Rio Grande do Sul, contributing to an understanding of which communities were most affected. Accordingly, this study undertakes a preliminary analysis to understand the degree of exposure to risks arising from the climatic disaster and its consequences, with the aim of contributing to the development of a more qualified repertoire of responses, adaptations, and resilience actions in and for these territories.

The *Diagnosis of Certified Quilombola Communities in Rio Grande do Sul* (Kroeff *et al*. 2023), conducted through a partnership between the State Government and EMATER/RS, compiled a series of data on the sociodemographic characteristics of quilombola communities in the state. The study revealed that most quilombola communities are located in rural areas—113 communities—while only 17 are situated in urban zones. The predominant level of schooling is incomplete elementary education, observed in 99 communities. Regarding access to water, only 48.84% of communities are connected to the public distribution network, with the most common alternative sources being wells (33.86%) and hand-dug wells (*cacimbas*) (27.51%). The main sources of income include pensions (83.72%), social programs (79.84%), daily agricultural labor (69.77%), agriculture (58.14%), and self-employment (36.43%). Crop production, primarily oriented toward self-consumption, is present in 80% of communities, while livestock farming occurs in 60% (Kroeff *et al*., 2023, p. 60). Although 69% of communities market part of their production, 72% do not have organized groups for this purpose (Kroeff *et al*., 2023, p. 94). Access to these localities is generally precarious, with unpaved roads in 66.15% of cases.

The data provided by the diagnosis highlight the condition of structural vulnerability of quilombola communities in Rio Grande do Sul. Geographic isolation represents a significant risk factor for increased social vulnerability in scenarios of climatic disasters—such as floods. Poor access infrastructure not only hampers mobility but also restricts the flow of agricultural production, an important complementary source of income. This isolation may be further aggravated by the fact that 51.54% of certified quilombola communities are not located in territorially continuous areas (Kroeff *et al*., 2023, p. 31). Limited access to safe drinking water and low levels of schooling indicate weaknesses in basic infrastructure and human capital. Moreover, dependence on pensions and social programs—combined with self-consumption as the primary destination of agricultural production—points to a subsistence-based economy that constitutes an additional vulnerability, as extreme climatic events can directly affect agricultural production, which is essential for the survival of these communities.

This scenario can be understood through the concept of socioenvironmental vulnerability, which reveals how climate change amplifies pre-existing inequalities, creating risks that affect both social life and material conditions of survival. In the case of quilombola communities in Rio Grande do Sul most affected by the 2024 disaster, pre-existing vulnerabilities were intensified, such as limited access to potable water and geographic isolation resulting from poor road conditions and restricted access to their localities. This context allows

for an empirical visualization of the notions of socioenvironmental vulnerability and climate justice, which refer to the asymmetric distribution of environmental impacts, whereby poorer and marginalized populations generally bear the greatest burden of climate change impacts, perpetuating cycles of inequality and vulnerability. Thus, vulnerability involves the limited capacity of certain populations—especially those in rural areas—to respond to environmental changes. Dependent on natural resources, these communities also become more susceptible to the loss of livelihoods in cases of flooding, resulting in unemployment, food insecurity, and water insecurity (Santos; Oliveira; Lopes, 2023).

Vulnerability is also intrinsically linked to the notion of uncertainty, as climate change introduces variables that are difficult to predict, complicating adaptation at both local and global levels. This unpredictability highlights the importance of considering the political and institutional factors that influence populations' capacity to access resources and to develop effective adaptive strategies. There is substantial criticism of approaches that address vulnerability in a reductionist manner, focusing solely on biophysical aspects—such as exposure to natural hazards—while neglecting the economic, social, cultural, and political factors that shape populations' response capacities. Vulnerability is therefore deeply connected to structural and institutional conditions that affect access to resources and opportunities (Rosa; Fleury, 2024).

Within this framework, the notion of climate justice integrates reflections on the effects and responsibilities associated with environmental problems such as global warming and is aligned with efforts to ensure that vulnerable populations—including Indigenous peoples, quilombola communities, and low-income groups—are not disproportionately affected by these phenomena. This approach seeks to address the historical conditions of vulnerability experienced by these populations, rooted in the conquest and colonization of Latin America. This process unfolded through the enslavement and servitude of Indigenous peoples and trafficked Africans, as well as through the imposition of the concept of race, which established divisions among social groups by means of binary codifications—such as superior and inferior, civilized and savage, developed and underdeveloped, modern and traditional. These divisions relied on the construction of negative images of "others," positioning certain groups as superior and legitimizing European colonial domination, thereby naturalizing control over non-European populations (Quijano, 2011; Escobar, 1995, 2005, 2007). This historical condition of vulnerability experienced by traditional populations is currently described as environmental injustice and/or environmental racism, reflecting the notion of structural racism—that is, the

ways in which racial discrimination is systematically embedded within social structures and institutions, hindering access to resources and adequate public policies.

Climate justice acknowledges that the socioenvironmental crisis does not affect all populations equally and that risks are unevenly distributed, mirroring historical and structural hierarchies inherited from colonialism. This perspective connects the global ecological crisis with social inequalities, denouncing the fact that those who have contributed least to the climate crisis—such as Indigenous peoples, quilombola communities, and peripheral populations—are among the most vulnerable to its impacts, including floods, droughts, agrochemical contamination, and forced displacement. It also points to the disproportionate role played by the consumption patterns and development models of Global North countries and economic elites in generating the crisis, thus challenging the abstract universalism of environmental solutions and calling for differentiated accountability from major emitters and beneficiaries of natural resource exploitation (Andreassa, 2024; Persch *et al.*, 2023).

The concept of environmental racism, as addressed by Malcom Ferdinand (2022), goes beyond conventional understandings that limit it to the unequal distribution of pollution and environmental degradation. As Angela Davis notes in the preface to Ferdinand's work, the author exposes the deep interconnections between colonialism, slavery, and environmental destruction, demonstrating that racism not only determines who disproportionately suffers environmental impacts but also structures the very conditions that enable the continued exploitation of the Earth and its beings. In this sense, environmental racism is not merely a byproduct of social inequalities but a constitutive element of the ecological crisis itself. Ferdinand underscores that "the confrontation of antiracist, decolonial, and feminist movements with the environmental degradations of the Earth is, in fact, *an extension of their struggles*" (Ferdinand, 2022, p. 268, emphasis in the origina, our translation).

Accordingly, communities' capacity to adapt to climate change depends on their access to institutional systems that may either facilitate or constrain such adaptation. Understanding these dynamics is crucial for developing broader and more effective strategies to address the adversities imposed by climate change and to promote resilience in vulnerable contexts. To reduce uncertainty, global technocratic and infrastructure-based solutions are insufficient if they fail to consider how local populations can adapt using their own resources and assets. It is therefore essential to adopt analytical approaches that allow for an immersive investigation of each community's reality and that promote dialogically constructed solutions, respecting the perceptions and needs of traditional communities within their territories.

From this perspective, vulnerability entails recognizing that territories are shaped by a multiplicity of forces—from economic and environmental pressures to local strategies of survival and reconstruction. The landscape traversing these territories becomes a field for analyzing resilience and practices of reoccupation, in which quilombola communities are not merely passive recipients of public policies but active subjects who recreate and defend their territories, responding in situated and proactive ways to the challenges imposed by a multidimensional crisis. We draw on the notion of "landscape" proposed by anthropologist Anna Tsing (2019), who conceptualizes landscape as an analytical tool that reveals how devastated environments are shaped by global forces and local practices, becoming spaces of negotiation and adaptation between human and non-human agents. This analysis requires a "biosociocultural" lens capable of overcoming dichotomies and disciplinary distances, adopting an "ecological" approach inspired by authors who, despite conceptual and methodological differences, articulate knowledge from the natural and human sciences in a non-dichotomous manner[15].

The contribution of anthropologist Emilio Moran (2022) is particularly useful for understanding the term "biosociocultural." Moran emphasizes that human adaptation depends both on behavioral plasticity and on the transformation of the environments in which populations live, highlighting the dynamic interaction between social actors and ecosystems. Human adaptation is thus presented as a complex process encompassing physiological, cultural, and social responses integrated with ecological systems and the challenges posed by global environmental change. In this sense, vulnerability to climate change emerges from the intersection of environmental factors and historically rooted social inequalities, leaving marginalized communities more exposed and disproportionately affected (Rosa & Fleury, 2024). While the effects of climate change may signal, for those who benefited from the colonial project, the end of the world as it is known, for many other extramodern peoples the world has already ended—and continues to end—as emphasized by Krenak (2019).

Although climate change is a global phenomenon, its impacts on different human groups are profoundly unequal: on the horizon shared by all of us lies a catastrophe yet to come; for peoples first dispossessed by colonization and, over time, by capitalist exploitation, catastrophe is "ancestral" (Povinelli, 2023). The lack of access to assets—that is, the absence of opportunities for certain populations to mobilize the resources necessary to adapt to climate

[15] See more at: Whitehead (1993), Bateson (1987), Ingold (2000), Haraway (2003), Morin (2003) and Tsing (2019).

change—constitutes a form of vulnerability that goes beyond mere exposure to climatic risks. This limitation is directly linked to the absence of means to use or replace local assets, which prevents these communities from developing effective responses to mitigate the damage caused by climate-related disasters and, consequently, reinforces a cycle of vulnerability and marginalization.

In this context, issues related to power, wealth concentration, and the strongly protected interests of global elites are central to reflections on the possibilities for expanding climate justice[16]. From this perspective, health promotion is not limited to physical well-being but also encompasses fundamental rights such as access to land, safe drinking water, healthy food, and the preservation of cultural traditions. Socioeconomic, environmental, and health crises are deeply interconnected, requiring a comprehensive approach that addresses all these dimensions in order to ensure climate justice. These overlapping crises have underscored the importance of mobilization and open dialogue among the various affected and involved actors, highlighting the strategic relevance of sociotechnical mediation processes and extension activities. The principles guiding the approaches of technoscientific institutions and public policy–promoting bodies toward traditional peoples and communities thus become a fundamental component of the interaction and mobilization processes necessary for these groups to access rights and exercise citizenship.

Conclusions

The socioenvironmental crisis and climate-related disasters expose the structural inequalities that have historically affected quilombola communities in Brazil. The vulnerability of these populations is not limited to the physical impacts of extreme events—such as damage to collective infrastructure and livelihoods—but is embedded within a broader context of economic, social, and political exclusion. Addressing these challenges requires an interdisciplinary approach that values both scientific and traditional forms of knowledge. However, this does not entail a mere "epistemological elevation" of traditional knowledge to the status of scientific knowledge; rather, it requires recognizing their differences and distinct potentials. As Antônio Nego Bispo (2020) argues, this is not a process of convergence but of "refluence," in which synthetic (scientific) knowledge ceases to attack organic (traditional)

[16] The fight for climate justice is thus intrinsically linked to the promotion of a more just, democratic, and egalitarian society, in which everyone has the right to health and a balanced environment, as defined by the Brazilian Environmental Justice Network (RBJA).

knowledge, allowing the latter to operate according to its own essence. Accordingly, the integration of these forms of knowledge should not involve the subordination of traditional knowledge to a dominant scientific logic, but rather the strengthening of community-based adaptation and resilience strategies grounded in the cosmologies of traditional peoples.

Climate justice must be understood as a process that goes beyond the mitigation of environmental impacts. By recognizing that socioclimatic disasters affect vulnerable populations unevenly—particularly those in and from the Global South—it seeks to guarantee the right of historically marginalized groups to actively participate in the formulation and implementation of public policies. Overcoming environmental inequalities in Brazil requires a genuine commitment to resource redistribution, the expansion of political participation by affected communities, and the development of response strategies that respect the cultural and territorial specificities of traditional peoples.

Although advances have been made in studies and initiatives involving traditional peoples and communities in recent years, such work remains undervalued both within academic settings and in sociotechnical research and innovation centers. For this reason, it is essential to engage with and build upon the history, culture, lived realities, social relations, modes of production, and creative capacities—broadly understood—of these social groups in order to jointly develop solutions to the problems affecting employment and income generation and, more broadly, their everyday lives. In terms of knowledge production, this study aims to contribute to an overall understanding of risk perceptions and the impacts of the recent climate disaster in the state of Rio Grande do Sul. We argue that the social and multidimensional challenges associated with the climate crisis demand an interdisciplinary approach. Studying traditional communities within their territories requires analyses that address the intersection of multiple factors, calling for specialized and in-depth perspectives.

Finally, we emphasize the importance of future studies—or potential lines of inquiry for further research—that examine how pre-existing vulnerabilities may hinder responses during extreme climate events and what local solutions traditional communities mobilize to confront such disasters. It is also crucial to assess which technocratic solutions adopted by governments have failed in quilombola communities, in order to reflect on more appropriate and context-sensitive alternatives. In this regard, we highlight the need for research grounded in multidimensional perspectives, capable of expanding knowledge about the specificities of these communities and supporting the formulation of more inclusive, effective, and contextually grounded public policies.

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