



Advances and challenges in disaster prevention in times of climate crisis

Avances y desafíos de la prevención de desastres en tiempos de crisis climática

Avanços e desafios na prevenção de desastres em tempos de crise climática

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ABSTRACT: The intensity and frequency of extreme weather events accentuate the deficiencies of vulnerable communities, highlighting the importance of disaster prevention through critical environmental education. This approach emerges as an essential tool for building capacities that contribute to breaking the socioeconomic order that generates inequalities. The study was conducted in Petrópolis, a mountainous municipality in the state of Rio de Janeiro, considered a critical zone in terms of disasters and their impacts due to its high socio-environmental vulnerability, which exacerbates existing inequalities. The research focused on the use of education as a tool for preventing disaster impacts, aiming to understand how communities are prepared for situations involving extreme weather events. To achieve this, qualitative methods and techniques were employed. In Petrópolis, advances in disaster prevention are evident through collaboration between the public sector and the community, which fosters a culture of prevention and encourages participation in public policy formulation and the creation of early warning systems. Additionally, the Center for the Defense of Human Rights, located in the municipality, works toward social justice and guaranteeing the population's rights. The city's greatest challenge in disaster prevention is overcoming the normalization of these phenomena and expanding the mobilization of social agents, with schools playing a more active role in community awareness and preparation.

Keywords: disaster prevention; critical environmental education; climate crisis; climate justice.

RESUMEN:

La intensidad y frecuencia de los eventos climáticos extremos acentúan las carencias de las comunidades vulnerabilizadas, de ahí la importancia de realizar la prevención de desastres mediante la educación ambiental crítica. Esta se presenta como una herramienta esencial para la creación de capacidades que contribuyan al rompimiento del orden socioeconómico generador de desigualdades. El estudio se llevó a cabo en Petrópolis, municipio serrano del estado de Rio de Janeiro, considerado una zona crítica en términos de desastres y sus impactos, debido a su alta vulnerabilidad socioambiental, lo que agrava las desigualdades existentes. La investigación se centró en el uso de la educación como herramienta para la prevención de impactos de desastres, con el objetivo de comprender cómo se prepara a las comunidades ante situaciones que involucran eventos climáticos extremos. Para ello, se emplearon métodos y técnicas cualitativas. En Petrópolis, se observan avances en la prevención de desastres gracias a la articulación entre el sector público y la comunidad, lo que fomenta una cultura de prevención e incentiva la participación en la formulación de políticas públicas y en la creación de sistemas de alerta temprana. Además, el Centro de Defensa de los Derechos Humanos, ubicado en el municipio, trabaja en favor de la justicia social y la garantía de los derechos de la población. El mayor desafío de la ciudad en la prevención de desastres es superar la naturalización de estos fenómenos y ampliar la movilización de agentes sociales, con un papel más activo de la escuela en la sensibilización y preparación comunitaria.

Palabras-claves: prevención de desastres; educación ambiental crítica; crisis climática; justicia climática.

RESUMO:

A intensidade e a frequência dos eventos climáticos extremos acentuam as carências das comunidades vulnerabilizadas, destacando a importância da prevenção de desastres por meio da educação ambiental crítica. Esta se apresenta como uma ferramenta essencial para a criação de capacidades que contribuam para romper a ordem socioeconômica geradora de desigualdades. O estudo foi realizado em Petrópolis, município serrano do estado do Rio de Janeiro, considerado uma zona crítica em termos de desastres e seus impactos, devido à sua alta vulnerabilidade socioambiental, o que agrava as desigualdades existentes. A pesquisa focou no uso da educação como ferramenta para a prevenção de impactos de desastres, com o objetivo de compreender como as comunidades são preparadas para enfrentar situações que envolvem eventos climáticos extremos. Para isso, foram utilizados métodos e técnicas qualitativas. Em Petrópolis, observam-se avanços na prevenção de desastres graças à articulação entre o setor público e a comunidade, o que promove uma cultura de prevenção e incentiva a participação na formulação de políticas públicas e na criação de sistemas de alerta precoce. Além disso, o Centro de Defesa dos Direitos Humanos, localizado no município, trabalha em prol da justiça social, buscando a garantia de direitos à população. O maior desafio da cidade na prevenção de desastres é superar a naturalização desses fenômenos e ampliar a mobilização dos agentes sociais, com um papel mais ativo da escola na sensibilização e preparação comunitária.

Palavras-chave: prevenção de desastres; educação ambiental crítica; crises climáticas; justiça climática.

1. Introduction

The climate crisis affects the biosphere, and its social implications expose and aggravate existing inequalities, accentuating social tensions at various scales. In the current context of climate emergency, it is undeniable that its genesis is associated with an economy of barbarism,

aligned with the advance of neoliberalism and globalization, which have proven increasingly exclusionary. Thus, the social dimension of the climate crisis requires growing attention, as societies are at the origin of the problem and must assume the search for solutions (Mucache & Giovinazzo Júnior, 2023).

Climate impacts have become increasing-

ly evident according to research conducted by the Intergovernmental Panel on Climate Change (IPCC). This organization estimates that human activities have caused global warming of approximately 1.1°C relative to pre-industrial levels. Greenhouse gases (GHGs) have likely contributed to warming between 1.0°C and 2.0°C. In 2019, approximately 79% of global GHG emissions came from the combined sectors of energy, industry, transport, and buildings, while 22% of emissions were attributed to agriculture, forestry, and other land uses (IPCC, 2023).

With the increase in extreme weather events, people are suffering losses due to the frequency and intensity of phenomena such as hurricanes, floods, and droughts, which are affecting their means and ways of life, as well as their security. This can lead to disasters that, according to Quarantelli (2015), are social events resulting from human actions. The author also referred to the social system as the generator of disasters, arguing that it is in the social context where both explanations and responses for their treatment are found.

Prevention, preparedness, mitigation, response, and recovery actions are present in the National Policy for Protection and Civil Defense, approved by the Brazilian government in 2012 (Brasil, 2012). Among the different coexisting perspectives in the field of disasters, there is consensus that prevention is a fundamental stage that crosses various public and social policies and that education is an important tool for its development.

Formative processes have the potential to foster the construction of knowledge that enables the mitigation of climate crisis impacts and the

adoption of a critical and complex perspective toward a problem that is not always approached from an educational standpoint. In this sense, we agree with Lima and Layrargues (2014) in affirming that facilitating the inclusion of debate about daily actions and participation in movements oriented toward the climate issue can broaden understanding of the climate phenomenon.

The research presented in this article analyzed the advances and challenges of education for disaster prevention, based on the theoretical assumptions of critical environmental education. This transformative approach promotes debate in the face of civilizational crisis challenges and seeks to break with social values and practices contrary to public welfare and equity (Loureiro, 2003). In line with Leff (2004), environmental education is considered to represent a theoretical-practical attitude based on the cultural and ethical formation of individuals, challenging the homogenizing principles of rational and industrial modernity.

One of the main purposes of the research was to problematize the application of environmental education in disaster prevention actions at the community level. The research sought to contribute to the debate on disaster prevention through the analysis of multiple dimensions – social, economic, cultural, political, spatial, among others – that transcend the limits of a specific theoretical-disciplinary field. The study was carried out in Petrópolis, a mountainous municipality in the state of Rio de Janeiro, considered a critical zone in terms of disasters and highly vulnerable from a socio-environmental perspective, which exacerbates existing inequalities. In this context, the use of education as a tool for disaster preven-

tion was investigated.

The objective of this research was to understand how disaster prevention is carried out through community preparation for extreme weather events in Petrópolis, RJ. The premise is that critical environmental education can contribute significantly to disaster prevention by providing people with key knowledge about how to act before, during, and after impacts caused by these phenomena, which can save lives. The promotion of practical education not only advances theoretical understanding of the problem but also fosters the creation of transformative actions that break with inaction and establish connections between the climate challenge and daily life (Lima & Layrargues, 2014).

The study conducted in Petrópolis, RJ, adopted an interdisciplinary perspective and employed qualitative methods and techniques to investigate how the educational process develops in relation to disaster reduction. Qualitative research strategies allow for in-depth exploration of specific cases and understanding of complex social phenomena (Minayo, Souza, Constantino & Santos, 2005). Data collection was carried out through interviews with six key actors: the Secretary of Protection and Civil Defense of the municipality, the Director of Monitoring and Evaluation of Civil Defense, leaders of the Community Centers for Protection and Civil Defense (NUPDEC) of the Caxambu and Floresta neighborhoods, and the Executive Coordinator of the Center for the Defense of Human Rights, with whom disaster prevention was discussed.

Through the interviews, we sought to obtain qualitative data that would allow us to

understand how disaster prevention develops in Petrópolis. The respondents' answers made it possible to analyze the knowledge transmitted and how community agents articulate around disaster prevention. In this sense, we agree with Minayo (2001), who points out that qualitative research focuses on a level of reality that cannot be quantified and seeks to investigate the meanings, aspirations, and values of the subjects involved.

The analysis of information collected in the interviews was carried out through qualitative coding, a process that, according to Dabenigno (2017), uses codes to group diverse testimonies. These codes are dynamic and allow content to be expressed in different ways, as they are created by each researcher combining inductive and deductive procedures. In this research, three study dimensions were defined: the content and knowledge employed in disaster prevention training; the consideration in the educational process of socio-environmental aspects, such as inequalities and sustainability; and finally, the articulation of social agents in the prevention process.

In a global context marked by continuous disaster impacts affecting society, it is essential to promote education to reduce damage caused to vulnerable people and build capacities to face these events (Olivares, *et al.*, 2023). Through critical environmental education, we believe it is possible to contribute to minimizing these effects, promoting their participation in decision-making that guarantees them a safer life. Furthermore, this education facilitates collaboration among various individual and collective subjects with the aim of generating knowledge and wisdom committed to social action.

2. Disaster, climate justice, and prevention

Systematic measurements show that the climate has changed and that meteorological phenomena are intensifying in both frequency and intensity. However, their impact only becomes a disaster when precarious living conditions exist, aggravated by social inequality (Lavell, 1994; Quarantelli, 1996; Valencio, 2013).

The climate crisis not only exacerbates social inequalities but can also be understood as an axis of oppression that adds to problems related to poverty, education, access to common goods, sexual violence, and other factors that, when overlapping, generate profound situations of inequity (Louback & Lima, 2022). In this sense, we agree with Siquiera (2015), who stated that disasters intensify social problems and, at the same time, are an expression of them.

Inequalities directly influence the disruption of living conditions of communities and individuals. Therefore, some authors argue that disasters are not natural but socio-environmental, as they result from the combination of vulnerability of certain populations and natural phenomena (Sepúlveda Saravia & Fuentes Aguilar, 2023). From a critical approach, Dutra (2021) proposes that the occurrence of a disaster is a consequence of the rupture in the relationship between society and nature.

Disasters are simultaneously a situation and a process that reflect social failure, as well as the complexity of subjects and social forces in action. A disaster can be described as a tragic and punctual event, without denying its character as a chronic crisis in the social sphere. An analytical

convergence between situation and process is therefore possible. In this sense, disasters can also combine elements of routine and non-routine situations (Valencio, 2013).

This article adopts a social perspective of disasters that transcends the traditional view of an event limited to the beginning and end of the tragic event. It also questions ideas that attribute the main cause of disasters to damage and fragility of physical structures, as well as those that exclusively blame nature. In this sense, the focus should not be on the causal agent but on the social processes that allow certain physical factors to lead to tragedies (Quarantelli, 2015).

Various discourses and practices analyzed from the social sciences reveal accounts of social suffering and resistance by those affected, as well as power dynamics and disputes around the definition of what constitutes a disaster (Marchezini, 2017). From this social perspective, disasters are processes interconnected with economic, political, social, environmental, and cultural factors, reflecting the complexity of the social world (Valencio, 2013).

In most Brazilian municipalities, social injustice and daily risks manifest in disasters. The Interactive Map of the Digital Atlas of Disasters in Brazil (2023) reveals that between 2013 and 2022, 30,525 disaster records were identified, with a total of 165.49 million people affected. In 2024, Brazil recorded a record 1,690 disaster events, concentrated mainly in metropolitan regions such as São Paulo, Belo Horizonte, Rio de Janeiro, and Salvador de Bahia (CEMADEN, 2025). According to Scotti and Pereira (2022), there is no doubt that the denial of the right to life

has caused the death of thousands of people in the country, a situation that has intensified in recent years due to the climate crisis, the exclusion of broad sectors of the population from access to basic resources, and the lack of equity, especially affecting the poorest groups, also composed of Black women.

The existence of inequalities between social groups and classes in the face of climate crisis impacts aggravates precarious conditions of access to income and basic citizenship services, such as health, security, education, and infrastructure, which are increasingly scarce. In this context, disaster management must consider social inequalities, the different conditions between countries and people, as well as the need to propose new responses.

According to Stein and Stein (2022), disaster prevention must address injustices aggravated by the climate crisis, which implies considering human rights and community needs to ensure that climate solutions are distributed equitably. Climate problems disproportionately affect social minorities, who are often forced to live in vulnerable areas, facing situations of climate injustice. Therefore, it is essential to act against the causes of global warming and the inequalities that perpetuate it (Yildirim, 2020). Furthermore, people are often blamed for living in poverty, transferring to individuals the responsibility for the precarious circumstances in which they live, which only aggravates the problems and distances us further from substantial measures.

In the debate on disasters, collective community participation is fundamental. Citizen participation becomes a key mechanism for legit-

imizing and ensuring the sustainability of local processes in disaster management. Therefore, the intervention of various social agents contributes to strengthening continuous projects and consolidating their own organizational structures (Coto-Cedeño, *et al.*, 2023).

Community participation in disaster management must consider historical experience, which articulates and configures actions in territories. It is not enough to identify the past; it is essential to learn from its lessons to structure a possible future and not sell it as just another commodity (Krenak, 2020). Disaster management requires critical reasoning that fosters recovery and reflection, with the main objective of managing and organizing territories. It is fundamental to consider both the decision-making power of the population that inhabits them and the State's responsibilities regarding social protection and rights guarantee.

Therefore, it is crucial to prepare people for disaster prevention through community movements that defend environmental and climate rights. In this sense, the right to knowledge of affected communities must be a central element for developing adequate perception of dangers and acquiring knowledge about factors that make them vulnerable. This will allow them to mobilize in the struggle for social and environmental justice, improving their living conditions and ensuring their safety (Gallardo, *et al.*, 2024).

The Sendai Framework for Action (2015-2030) proposes expanding the participation of various social actors in disaster prevention, promoting public awareness, prevention culture, community resilience, and education. This approach seeks to promote inclusive policies that

involve all of society, reinforcing interaction between different groups.

Access to data and information is fundamental for generating knowledge. In the context of disasters, the population must be prepared to act, and this is only possible through adequate education (CEMADEN, 2023). In Brazil, the creation and maintenance of Community Centers for Protection and Civil Defense presents a possibility in this direction, as will be addressed in this text.

3. Contributions of environmental education to disaster prevention

Disasters are socially constructed, and education can play a crucial role in reversing this situation. Its function is to contribute to transforming the conditions that generate disasters, increasing prevention capacity through participatory processes in communities. Both education for disaster reduction and environmental education favor critical understanding of socio-environmental problems (CEMADEN, 2023).

Environmental education can contribute significantly to disaster prevention by providing knowledge, skills, and values necessary to face challenges related to the climate crisis. According to Tamonio, Gomes, and Willms (2020), critical environmental education reflects a commitment to a sense of urgency, highlights the existing threat level, stimulates participation and articulation, establishes dialogues with vulnerable social sectors, promotes collective political actions, encourages the incorporation of subjectivity, values material and immaterial culture, and strengthens political formation.

Environmental education for disaster prevention must contribute to preparing people with knowledge about the environment in which they live, fostering a harmonious relationship with nature, achieving participation and articulation among neighbors, and creating networks that facilitate interactions with institutions and various community actors. Environmental complexity not only requires us to learn new facts but also inaugurates a pedagogy that implies the reappropriation of knowledge from the being of the world and being in the world, from knowledge and identity that are formed and integrated in each individual and each culture (Leff, 2009).

Environmental education for disaster prevention represents an opportunity to strengthen resilience capacity in communities. Being closely linked to people's lives, it allows for non-traditional pedagogical activities that promote reflection, participation of community actors, schools, and civil society organizations (Preston, 2012).

Through critical environmental education, it is possible to understand the inequalities that aggravate climate injustices, considered one of the main factors contributing to disasters, and articulate forces to face them collectively. Among its fundamental functions is challenging the capitalist system and proposing a sustainable life model, which implies overcoming the anthropocentric vision that places human beings at the center of the universe and, at the same time, breaking with a catastrophic perspective that denies the possibility of other worlds beyond what has been presented in the context of global capitalist hegemony. In this sense, we agree with Layrargues (2020) in highlighting environmental

education as a civilizing task.

According to Costa and Loureiro (2013), environmental education contributes to understanding the connection between economic growth and the increase in extreme weather events. To achieve this understanding, it is necessary to eliminate epistemological barriers between disciplines and include a complex perspective of the problem. Critical environmental education processes allow reflection on the dynamics in the relationship between society and nature. Without this analysis, the debate becomes simplistic, fragmented, and depoliticized by ignoring the material contradictions present in social relations.

Disaster prevention through environmental education offers a way to deepen this fundamental topic. The solidity and coherence of knowledge develop through constant confrontation with reality and continuous practice of constructing the socially real. Environmental knowledge finds its ideal in the potential of the tangible and in the materialization of desires that drive material principles and social meanings, with the objective of creating a new reality based on a transformative environmental rationality (Leff, 2012).

In disaster prevention, critical environmental education, when developed in communities, must recover historical memory about the impacts of extreme weather events, for, as Walter Benjamin (2020) teaches us, only by confronting the past can we imagine a future. This allows for developing measures that prevent the repetition of disasters. To achieve this, it is fundamental to encourage people's participation in training processes, both formal and informal. Likewise, local knowledge should be promoted with the

objective of raising awareness levels among inhabitants and strengthening their capacities to demand that government authorities effectively fulfill their human rights.

Critical environmental education for disaster prevention must contribute to providing people with the necessary knowledge to act before and during extreme weather events. This includes understanding the social, environmental, and economic aspects that affect these situations, in order to adopt measures that reduce disaster impacts on their lives and form as political subjects capable of mobilizing collectively around their rights. Fostering practical education not only improves theoretical understanding of the problem but also drives the implementation of transformative actions that overcome inaction, linking the climate challenge with daily life (Lima & Layrargues, 2014).

For Mazzeo and Jacobi (2016), education must contribute to citizen formation, opening paths for people to assert their collective rights and interests. Disaster prevention through public policies must promote effective dialogue between science, politics, and society, with the objective of overcoming current reality, characterized by more difficulties and inefficient strategies than successful experiences. Environmental education can prepare people to participate in decision-making that guarantees a dignified life and encourages collaboration among various actors, promoting knowledge and social actions. Furthermore, this education allows for taking advantage of learning derived from implemented practices.

In the context of disaster prevention, environmental education is transmitted through

warning signs, leaflets, schools, radios, and social networks, which disseminate information and foster learning, but also through coexistence, establishing trust bonds, and collective construction. These tools also urge the population to reflect on what to do, how to act, and how to respond in case of disaster. In this sense, disaster education is considered public pedagogy, as it teaches how to mobilize society (Preston, 2012).

Environmental education for disaster prevention, in addition to developing in the public sphere, must be integrated into schools as part of formal education. It is indisputable that schools play a crucial role in raising awareness among students, teachers, and families about disasters. Likewise, disaster education acquires relevance at extracurricular, community, and family levels (Valladares, 2022). The most recent educational reforms in Brazil are still far from incorporating such current and urgent debates for people's lives.

As defended in this article, environmental education for disasters critically addresses the idea that natural events are external to society. On the contrary, their impact is the result of a civilizational crisis that generates a dichotomy between nature and society. Disasters are products of human actions and decisions, especially those linked to the predominant economic model and various forms of human intervention on the planet (Pietrocola *et al.*, 2021).

Environmental education for disaster prevention contributes to understanding the connection between economic growth and the increase in extreme weather events. To achieve this understanding, it is fundamental to overcome epistemological barriers between disciplines and

integrate a complex perspective of the problem. As Gaudiano *et al.* (2020) explain:

Addressing the lack of knowledge in the field of social sciences about climate change has become a decisive variable in decision-making and its connection with contributions from climate sciences, setting guidelines for the challenges of the new transdisciplinary research agenda and the urgency in making decisions in the face of the climate crisis (Gaudiano *et al.*, 2020 p.849).

Disaster prevention through environmental education constitutes an essential path to expand knowledge about this crucial topic. The consistency and coherence of knowledge are built through constant confrontation with reality and through continuous practice oriented toward the construction of the socially real. Environmental knowledge projects its utopia from the potential of the tangible and the realization of desires that activate material principles and social meanings to build a new reality, based on an alternative environmental rationality (Leff, 2012).

Environmental education for disaster prevention is characterized by the following attributes: it is practical and lifelong; integrates formal, informal, and non-formal spheres; is didactically versatile; has a sociocultural, participatory, and community approach; and is critical and socially transformative. Through this education, it is possible to develop various capacities, both individual and collective, including acting in disaster preparation and mitigation; protecting oneself against them and facing subsequent stages; rehabilitating affected areas and reconstructing safe zones; and providing voluntary help to protect

other people (Valladares, 2022).

In the context of the climate crisis, human rights are under threat, including access to water, food, safe housing, and other fundamental rights related to the preservation of life, constantly at risk due to extreme weather events. Through environmental education, it is possible to train people to participate in decision-making that guarantees a safe life. Environmental education for disaster prevention can play a key role in promoting climate justice by providing the knowledge, skills, and values necessary to address challenges arising from the climate crisis. To achieve this objective, it is fundamental that communities understand the concept of “climate justice” through knowledge that evidences inequalities in the distribution of risks and resources related to climate change.

4. Advances and challenges of critical environmental education for disaster prevention in Petrópolis/RJ

The municipality of Petrópolis is located in the metropolitan region of Rio de Janeiro. It has an average altitude of 840 meters above sea level and borders the municipalities of Areal, Três Rios, São José do Vale do Rio Preto, Teresópolis, Guapimirim, Magé, Duque de Caxias, Miguel Pereira, Paty do Alferes, and Paraíba do Sul. It has a population of approximately 352,500 inhabitants (IBGE, 2022). The city is predominantly urban, and its economy is based mainly on tourism.

Petrópolis/RJ is located in a mountainous region with steep slopes, which favors the rapid descent of rainwater, increasing river levels and causing floods in waterproofed areas. Mass

movements are also frequent, with landslides, as rainwater falling on slopes flows toward valley bottoms (Daré, 2022).

The way the city has developed, with high concentration in urban areas and without adequate infrastructure to accommodate the most impoverished sectors of the working class, has made its territory historically marked by disasters (Dutra & Ferraz, 2024).

Intense rains, common during spring and summer, generate significant accumulations that increase the risk of disasters such as landslides, rockfalls, and floods, among others. These events often occur simultaneously, representing a serious risk to human life (Contingency Plan 2023-2024 of the Municipal Secretariat of Protection and Civil Defense).

Social inequalities present in the city, together with geological characteristics, the urbanization process, and land occupation with physical and natural alterations, evidence conditions conducive to the occurrence of floods, overflows, avalanches, and mass movements. On February 15, 2022, a tragedy occurred that left the highest number of deaths in its history. There were 242 people killed, countless material losses, and great suffering among those left homeless. The general coordinator of research and development at the National Center for Monitoring and Alerts of Natural Disasters (CEMADEN) stated that the disaster could have been prevented (National Geographic, 2022).

Disaster prevention in Petrópolis is carried out by the Municipal Secretariat of Protection and Civil Defense. According to CEMADEN (2023), Brazil has had mechanisms for disaster

prevention since the 1960s, initially developed to face floods and landslides in the southeast region, through Civil Defense action. Subsequently, the Federal Constitution of 1988 emphasized the importance of dialogue between government and society, reinforcing since then the participation of social organizations in this area.

Civil society participation is also present as a guideline in the National Policy for Protection and Civil Defense. For its effectiveness, municipal protection and civil defense bodies have as one of their strategies the creation of Community Centers for Protection and Civil Defense (NUPDEC). These centers aim to develop permanent processes of mobilization, guidance, and organization of the population, especially those residing in risk areas. NUPDECs operate at the local level and receive training from municipal Civil Defense bodies (Fonseca & Garcias, 2022).

In an interview, the Director of Monitoring and Evaluation of Civil Defense in Petrópolis stated that through NUPDECs, disaster prevention actions are carried out with the objective of fostering a community culture of self-protection. After the February 2022 disaster, new NUPDECs were established, and by the end of 2023, 37 centers had been created in 98 communities. These centers carry out training activities to train the population in the use of early warning systems, teach the operation of sirens and rain gauges installed in communities, and transmit knowledge and skills that allow for effective management of this information, thus contributing to saving lives.

The preventive actions of the Civil Defense Secretariat in Petrópolis, through NUPDECs, not only train the population but also provide them

with the necessary knowledge and skills to act effectively in risk situations. The community level is essential for disaster prevention because it allows people to actively participate in matters that directly affect them. Furthermore, it encourages community members to engage in finding solutions to their problems.

Despite Civil Defense actions with the population still being marked by a predominantly hierarchical logic, aligning with the characteristics of the Brazilian State, its policies (Mazzeo, 1997) and, more specifically, with the way civil defense itself was instituted (Dutra, 2021), thanks to NUPDEC work, community members have acquired fundamental knowledge. The NUPDEC leader from the Floresta community explained that the intense rains of January 28, 2024, did not cause human losses thanks to the functioning of the early warning system. According to her: “... *it's a lengthy process, but it really works...*”

The NUPDEC leader from the Caxambu community highlighted that they are now prepared to respond to disasters and know how to help people. She emphasized: “...*when the February 2022 catastrophe occurred, we didn't know how to help people. It was a shock, we weren't prepared*”. What was expressed by the Caxambu leader shows that the knowledge acquired with Civil Defense prepares them for extreme weather events.

It is important to consider that knowledge of reality is always limited by human capacities for understanding and that, therefore, the expected preparation may not be sufficient given concrete conditions. This process of multiplying social learning reinforces the commitment and aware-

ness of those who participate (Jacobi, 2023). According to Leff (2012), environmental knowledge is built through the interaction between theory and practice; it is not limited solely to an objective relationship with the world but opens to new interpretations.

Petrópolis Civil Defense prepared NUPDECs in the elaboration of participatory maps, a key activity for disaster prevention. Social cartography constitutes an important tool in environmental education within community spaces, as it allows for building contextualized knowledge and facilitates participants' reflection on their reality. This coincides with Lima & Layrargues (2014), who affirm that practical education stimulates the construction of transformative actions, capable of breaking with inertia and establishing connections with daily life.

In 66 Petrópolis communities, participatory maps were created that indicate evacuation routes and refuge points to protect the population in case of intense rains. The community leader from the Caxambu neighborhood explained that several virtual meetings were organized to identify reference points together with residents. In this process, emblematic places for the community were specified, such as schools, churches, and sports areas, and area reconnaissance was carried out, photographing key points to assess their accessibility. Once the maps were completed, they were placed in different locations in the neighborhood so that the entire population could access them.

Bargas and Cardoso (2015) explain that the map-making process facilitates both practical and symbolic participation of those involved,

establishing interpersonal relationships. In this way, the knowledge of local communities is highlighted, emphasizing their perception of the territory. The elaboration of participatory maps in Petrópolis, RJ communities was carried out with the collaboration of schools, the Municipal Education Secretariat, and the Secretariat of Social Assistance, Housing, and Land Regularization has played an important role in this context. Social cartography can be considered an environmental education activity, as it offers a creative and motivating space for communities, fostering new ideas that contribute to building sustainable societies (Gallardo *et al.*, 2020).

Environmental education for disaster prevention in communities must focus on a dialogical process, in which activities are attractive, simple, and clear, thus achieving that the target audience understands the message and becomes interested in acquiring greater knowledge of socio-environmental processes. According to what was stated by NUPDEC leaders in Petrópolis, they maintain systematic communication through WhatsApp groups and monthly meetings, which fosters dialogue in collective learning spaces.

Despite the advances observed in disaster prevention in Petrópolis, Civil Defense faces the challenge of expanding critical understanding of extreme weather events. To achieve this, it is essential to address climate emergency as a civilizational crisis, confronting political and economic obstacles that still play a determining role, such as the development model that privileges consumption (Lima & Layrargues, 2014).

In the city of Petrópolis, there are other institutions that contribute to disaster prevention

through critical environmental education. A notable example is the Center for the Defense of Human Rights of Petrópolis (CDDH), an organization that, since 1979, has worked in defense of vulnerable people and promotes various actions with local community movements. Its objective is to strengthen forms of community organization and expression. In times of crisis, it provides financial support and backing to people who have lost everything during disasters.

CDDH develops critical environmental education activities and is committed to human and environmental rights, addressing ecology as a transversal theme to the right to life. Among its actions for disaster prevention are the defense of the rights of the LGBTQI+ population, people with disabilities, older adults, religious diversity, and gender equity. It also fights for women's rights against domestic violence, protects children and adolescents, and promotes the recovery of historical memory and justice in favor of democracy.

CDDH activities also contribute to climate justice by defending social rights related to gender, decent housing, traditional peoples, vulnerable collectives, and social movements, among others. According to Pardo & Ortega (2018), climate justice, understood as a social and political movement, constitutes an emerging field in the relationship between environment and society. This approach opens new possibilities for analysis and action in the face of one of the most urgent global problems: the climate crisis.

Regarding the community of life, CDDH integrates into all its activities the perspective of respect for life, diversity, and Mother Earth,

basing its actions on the "Earth Charter." Within this framework, it understands that the planet is the "Common Home," where human beings are an integral, but not privileged, part of the ecological system. From this perspective, it actively participates in various networks and articulations (Carvalho, 2022).

The institution focuses on training children and young people to become multipliers of topics related to diversity, respect, public policies, the fight against violence, structural racism, and patriarchal structure. It also develops projects to promote human rights, foster knowledge exchange, and propose expanded public policies that include the rights of nature (Carvalho, 2022).

The study of two institutions in Petrópolis that carry out disaster prevention actions reveals how the Civil Defense Secretariat and CDDH address the socio-environmental issue from different perspectives, marked by their work in the public sector and organized civil society, respectively. Table 1 presents some of the contributions to prevention derived from the activities they carry out.

The contributions to disaster prevention from both institutions foster sensitivity and awareness of territorial problems, combat socio-environmental injustices, and interrelations between different social actors. When people know their environment and actively participate, bonds are established between neighbors and local institutions, which contributes to community resilience in the face of extreme weather events (González-Muzzio, 2013).

Despite advances in education aimed at disaster prevention carried out by Civil Defense in Petrópolis, much remains to be done to fully

TABLE 1 – Contribution of Civil Defense and CDDH of Petrópolis to disaster prevention.

Institution	Activities	Contribution to disaster prevention
Civil Defense Secretariat	<ol style="list-style-type: none">1. Creation of NUPDECs, community organizations through which mobilization, guidance, and permanent organization processes of the population are developed, especially those residing in disaster risk areas.2. Community education and awareness for disaster prevention3. Systematic communication with the population through WhatsApp groups and monthly meetings.	<ol style="list-style-type: none">1. They articulate the public sector with the community, which fosters participation in public policy generation and the creation of early warning systems.2. They use participatory cartography, based on local reality, promoting practical learning, establishing solidarity relationships, and collective work.3. They foster dialogue in communities before, during, and after disaster, which allows for social mobilization and articulation of actors.
CDDH	<ol style="list-style-type: none">1. Work with people with disabilities, older adults, children and adolescents, traditional peoples, vulnerable collectives, and social movements. Attends to spontaneous demands related to human rights, welcomes the population that reports rights violations, guides to responsible bodies, and accompanies in the solution.2. Socio-environmental education based on popular education.3. Defense of human rights and protection of life diversity.	<ol style="list-style-type: none">1. They promote equity and inclusion by defending equitable access to resources, information, and essential services, and contribute to disaster prevention and management policies being inclusive, without discriminating against vulnerable groups such as people with disabilities, indigenous communities, women, children, elderly, and people in poverty.2. They favor dialogue of knowledge and critical formation by denouncing activities that contribute to disaster occurrence, such as deforestation, uncontrolled urbanization, and indiscriminate exploitation of nature. They educate for sustainability following criteria of ecological balance, love for the earth and the community of life.3. They advocate public policies and inclusive plans, defend the protection of fundamental rights such as housing, health, drinking water, food security, and provide humanitarian assistance, thus contributing to climate justice.

SOURCE: Prepared by the authors based on data collected in the research.

utilize the potential of education in community spaces. Among the challenges is the need to expand critical understanding of extreme weather events. To address the climate emergency, it is necessary to consider the civilizational crisis as a source of political and economic obstacles that prioritize consumption and perpetuate the capitalist development model.

In Petrópolis NUPDECs, critical environmental education must also be developed, not only addressing issues related to civil protection against disaster impacts. It is crucial to

incorporate the issue of climate justice into the debate. Vulnerable communities, which are the most affected by extreme weather events, must become aware that the problem does not lie solely in natural conditions; there are also social, cultural, and political factors that contribute to aggravating inequalities in the face of extreme meteorological phenomena.

Environmental education must be critical and meaningful to generate the necessary effects in the community. It is not enough to provide information and conduct training focused mainly

on rescue issues. It is fundamental to promote the approach to problematic situations and involve various actors in the formative process, where schools can play a more active role.

In Petrópolis NUPDECs, the dialogue of knowledge must be oriented toward a deeper understanding of sustainability. According to Leff (2016), this must be conceived as a new vision of life, which implies the construction of a new economic rationality, as well as the promotion of other modes of sustainable production and consumption, with the validation of new knowledge and practices. The search for sustainability must be considered as the construction of cultural rights and civil society demands, oriented toward decolonization, autonomy, diversity, and dignity of peoples and as such, is not possible in the capitalist way of life.

In an interview with NUPDEC leaders, they expressed the demands they have presented to the municipal government, without yet receiving a response. The Caxambu representative highlighted the urgency of building social housing to prevent the occupation of land on hillside slopes, while the Floresta neighborhood leader emphasized that one of the most critical problems is road subsidence, which hinders evacuations in case of intense rains. These situations reflect the vulnerabilities faced by communities and evidence how the environmental injustice they suffer is intrinsically connected to the lack of access to land, housing, basic sanitation, and other rights expropriated daily. Municipal governments must address climate justice from a preventive approach, prioritizing attention to vulnerable communities and considering social and econom-

ic inequalities aggravated by the climate crisis. It is fundamental to address collective demands to ensure equitable distribution of benefits and costs associated with climate solutions (Stein & Stein, 2022).

The training process carried out in NUPDECs by Petrópolis Civil Defense needs to integrate the debate on human rights in the defense of climate justice. Various vulnerabilities are closely related to rights violations caused by the absence of a State that protects those who most need to benefit from public policies aimed at promoting social justice. There is no doubt that the denial of the right to life has caused numerous deaths due to the intensity of weather events and the lack of public policies for prevention, mitigation, adaptation, and resilience (Scotti & Pereira, 2022).

The climate crisis challenges the fulfillment of human rights, as it accentuates the lack of access to water, food, safe housing, and other fundamental aspects for survival, which are frequently threatened by extreme weather events. CDDH works in the defense of human rights through a set of actions that contribute to climate justice. However, due to its non-governmental nature, they do not have the capacity to reach all vulnerable people in Petrópolis. We agree with Kweitel and Neiva (2022) that states are obligated to mobilize the maximum resources for the progressive guarantee of human rights.

Through critical environmental education and articulation between public institutions, civil society, and local communities, it is possible to contribute to preventing disaster impacts by strengthening community response capacity. This

is achieved through the exchange of knowledge and wisdom about sustainability, evacuation plans, resource use, and immediate actions in emergency situations. This approach is especially important in contexts of climate crisis, where extreme events are increasingly frequent and intense.

5. *Final considerations*

The systemic and multidimensional crisis, a consequence of anthropocentrism, has given rise to a vision of development that disregards society as part of nature, denying the interconnection and dependence between natural and human systems. This perspective justifies a utilitarian vision of nature, considering it exclusively at human service, which has caused massive deforestation, soil overexploitation, intensive mining, and fossil fuel extraction, altering natural cycles and reducing ecosystems' capacity for self-regulation. This process has culminated in a climate emergency, exacerbated in recent years by the ongoing climate crisis, which has further deteriorated the living conditions of those denied access to basic resources.

Disasters are socially constructed processes, and the intensity and frequency of extreme weather events accentuate the deficiencies of peripheral communities. Hence the need for disaster prevention. Critical environmental education is an important tool in creating capacities that contribute to developing a critical vision of social reality and the inequalities produced, as well as creating strategies that affect them. Furthermore, due to its pedagogical potential to transform relationships between people and their environment,

this education contributes to building communities better prepared for adversities.

Critical environmental education favors the prevention of disaster impacts, which can result in the preservation of lives through practical education that fosters understanding of the problem and stimulates the implementation of collective actions that break with passivity. It establishes tangible connections between the climate challenge and daily activities. Disaster prevention through critical environmental education promotes dialogue and climate justice by revitalizing public debate, opening a path for citizens to assert their rights.

In the city of Petrópolis (RJ), advances in disaster impact prevention actions began to be recognized from the moment when Civil Defense expanded its articulation between the public sector and the community through NUPDECs, which fosters a culture of prevention and encourages participation in public policy generation and the creation of early warning systems. The use of participatory cartography, based on local reality, has stimulated practical learning and the establishment of solidarity relationships.

The Center for the Defense of Human Rights (CDDH) also makes a significant contribution to disaster impact prevention by acting in defense of equitable access to resources, information, and essential services, and promoting the integration of people with disabilities, indigenous communities, women, children, elderly, and people in poverty. Furthermore, it stimulates dialogue of knowledge and critical formation, denouncing deforestation, uncontrolled urbanization, and indiscriminate exploitation of nature. Through popular education,

it fosters love for the earth, ecological balance, and the community of life.

Civil Defense provides information and conducts training focused mainly on rescue issues. However, it is a challenge for this institution to promote the approach to problematic situations that reach the root of the social construction of disaster. It is necessary for educational activities to incorporate knowledge about sustainability critically, as this does not materialize automatically. It is the result of an educational process through which human beings redefine their relationships with the earth, nature, society, and themselves, following criteria of ecological balance, love for the earth, solidarity with future generations, and the construction of a socio-ecological democracy (Boff, 2013).

In Petrópolis, disaster prevention represents a significant challenge. It is necessary to overcome the naturalization of disasters and expand the mobilization of social agents, with a more active role for schools. It is necessary to strengthen community response capacity and increase public awareness about climate justice, as a space for the struggle for public policies that guarantee equitable social development. It is essential to build new articulations between the public sector, civil society, and communities to reverse the current situation and achieve other ways of life.

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