

Educommunication and socio-environmental justice: the contributions and tensions of audiovisual strategies to disaster risk reduction education

Educomunicação e justiça socioambiental: contribuições e tensionamentos das estratégias audiovisuais na educação para redução de riscos e desastres

Willian José FERREIRA^{1*}, Rodrigo Cesar da SILVA¹, Cheila Flávia de Praga BAIÃO¹, Marcelo dos Santos TARGA¹

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1 University of Taubaté
(UNITAU), Taubaté, SP,
Brazil.

* Contact e-mail: willian.jferreira@unitau.br

Abstract: The accelerated expansion of urban processes, aggravated by historical and ecological vulnerabilities, has altered ecosystems and exposed populations to new socio-environmental risks. This study examines how audiovisual resources can contribute to disaster risk reduction education (DRRE) through educommunicative practices that align with critical environmental education (CEE) and socio-environmental justice. The essay is based on four theoretical pillars: socio-environmental justice, CEE, risk communication, and educommunication. The study is based on the understanding that risks are social constructions that are produced and distributed unequally over time. Methodologically, an exploratory and descriptive mixed approach is adopted. This approach is based on mapping land use and land cover changes in Caraguatatuba, São Paulo (Brazil), using georeferenced data and a historical series of extreme rainfall events integrated in a geographic information system (GIS) environment through QGIS software. Based on this analysis, the educational documentary From Nature to Concrete was produced as a tool to raise awareness and mobilize the community in the face of local environmental risks. The main finding is that the audiovisual resource effectively translates scientific data into accessible, contextualized narratives that clarify collective perceptions of risk and vulnerability. The process also encouraged educators' and youth's engagement as mediators of knowledge and community action. We have concluded that audiovisual language can enhance DRRE, encourage critical community participation, and promote a culture of care, prevention, and socio-environmental justice.

Keywords: sustainability; resilience; spatiality; social participation.

Resumo: A expansão acelerada dos processos urbanos, agravada por vulnerabilidades históricas e ecológicas, tem transformado ecossistemas e exposto populações a novos padrões de risco socioambiental. Neste cenário, o estudo investiga de que forma recursos audiovisuais podem contribuir para a Educação para Redução de Riscos e Desastres (ERRD) por meio de práticas educacionais, alinhadas à Educação Ambiental Crítica (EAC) e à justiça socioambiental. A investigação fundamenta-se em quatro eixos teóricos: justiça socioambiental, EAC, comunicação de riscos e educomunicação. Parte-se da concepção de que os riscos são construções sociais, historicamente produzidas e desigualmente distribuídas. Metodologicamente, adota-se uma abordagem mista, com caráter exploratório e descritivo, baseada no mapeamento das transformações no uso e cobertura do solo em Caraguatatuba (SP), por meio de dados georreferenciados e séries históricas de precipitação extrema, integrados em ambiente de Sistema de Informação Geográfica (SIG), utilizando o software QGIS. A partir desse diagnóstico, foi produzido o documentário educativo Da Natureza ao Concreto, concebido como ferramenta de sensibilização e mobilização frente aos riscos ambientais locais. Entre os resultados, destaca-se a capacidade do audiovisual de traduzir dados científicos em narrativas acessíveis e situadas, favorecendo uma percepção mais clara sobre riscos e vulnerabilidades. O processo também estimula o protagonismo de educadores e jovens como mediadores do conhecimento e da ação

comunitária. Conclui-se que linguagens audiovisuais podem aprimorar a ERRD, encorajar a participação crítica das comunidades e promover uma cultura de cuidado, prevenção e justiça socioambiental.

Palavras-chave: sustentabilidade; resiliência; espacialidade; participação social.

1. Introduction

The accelerated expansion of urban processes has caused numerous transformations in socio-ecological dynamics, altering ecosystems and exposing populations to new patterns of socio-environmental risk (Keeler et al., 2019). It is projected that by 2050, around 68% of the world's population will live in urban centers, demanding infrastructure that is still lacking, imposing unprecedented challenges for urban sustainability (Organização das Nações Unidas [ONU], 2022). Consistent with Satterthwaite (2021), cities have become arenas of dispute between exclusionary development projects and emancipatory proposals aimed at environmental justice.

Although these dynamics manifest themselves on a global scale, their most acute effects take on particular contours in locations permeated by structural disparities and institutional weaknesses (Vieira et al., 2023). It is against this backdrop that the eastern part of the state of São Paulo, especially the Metropolitan Region of the Paraíba Valley and North Coast (RMVPLN), shows the intertwining of ecological vulnerability, disorderly urbanization, and socio-spatial exclusion (Silva et al., 2024). In municipalities such as Caraguatatuba, São Sebastião, São Luiz do Paraitinga and Campos do Jordão, the recurrence of floods, landslides and mudslides compromises the integrity of communities whose trajectories were built on the margins of the most basic urban guarantees (Peres & Peres, 2021; Almeida et al., 2023).

According to Andrade et al. (2019), far from isolated events, these experiences make up a historical fabric marked by the discontinuity of public policies, reactive management and the invisibilization of local knowledge. This picture is confirmed by studies and community memories, which show the material impacts of these tragedies, as well as the symbolic marks left by successive cycles of abandonment and reconstruction (Amaral & Fuck, 1973; Santi, 2017). It is therefore becoming increasingly important to build paths that link environmental justice, collective memory and critical educational processes aimed at understanding and dealing with risks.

In the region, initiatives such as the North Coast Disaster Risk Reduction Education Network (R-ERRD-LN) emerge as promising experiences at the intersection of education, territory, and prevention. Created in 2019, the Network brings together educators, researchers, public agents, and representatives of civil society to promote training aimed at DRRE in the municipalities of the North Coast of São Paulo (Rede de Educação para Redução de Riscos e Desastres do Litoral Norte de São Paulo [REDE], 2025). In addition to offering educational

activities, the R-ERRD-LN fosters dialogue between technical-scientific and community knowledge, encourages participatory risk monitoring practices and seeks to strengthen the actions of schools and local groups in the face of climate vulnerabilities.

Despite the work of the R-ERRD-LN, the RMVPLN still lacks critical systematizations and theoretical references that qualify DRRE training practices. Although the Sendai Framework (2015-2030) recognizes education, democratic governance, and community protagonism as strategic pillars for building resilient societies (United Nations Office for Disaster Risk Reduction [UNDRR], 2015), their materialization in many municipalities remains incipient.

The experience of producing an educational documentary focused on raising awareness of socio-environmental risks and vulnerabilities serves as the basis for this study. The documentary was made in Caraguatatuba, a municipality in the RMVPLN marked by recurrent extreme events. The documentary is the result of a combination of historical rainfall data, analysis of land use and land cover and audiovisual practices for educational purposes, seeking to explore the expressive possibilities of environmental communication as an effective educational device in contexts of inequality.

It is at this point that dialogue with the foundations of Critical Environmental Education (CAT) becomes pertinent, a perspective that rejects instructional approaches and recognizes the singularity of individuals in disputes over socio-environmental justice (Carvalho, 2004; Loureiro, 2007). In line with this, the Sociology of Risk, especially the concept of reflexive modernity formulated by Beck (2010), emphasizes that technical-productive advances themselves generate threats and inequalities. This calls for educational forms that align a critical reading of reality with transformative action. Thus, the construction of accessible and localized languages contributes to the collective appropriation of knowledge about risks, expanding social mobilization and the influence on decisions that shape territories.

Added to this path are the contributions of Educommunication, a field that integrates educational and communicational processes in favor of critical expression and social engagement (Kaplún, 1999; Soares, 2014). In the field of environmental communication, these practices play a strategic role in the development of languages aimed at the collective appropriation of knowledge about risks. As noted by Souza Correia et al. (2018), environmental educommunication incorporates the environment, communication and education, sensitizing subjects and boosting participatory processes in territories marked by vulnerabilities.

From this point of view, the question is: how can environmental communication strategies affect the DRRE, helping to increase awareness of socio-environmental risks and encourage preventive action in the RMVPLN? This question is in line with the commitments of the 2030 Agenda, especially Sustainable Development Goals 11 (Sustainable Cities and Communities), 13

(Action against Global Climate Change) and 4 (Quality Education), aimed at building more prepared, informed, resilient societies.

Based on this horizon, this article aims to understand how environmental communication strategies anchored in audiovisual resources can contribute to strengthening the DRRE in the RMVPLN. The aim is to encourage debate on risk communication in contexts of inequality and vulnerability, recognizing in audiovisual languages a formative power in the production of meanings, in broadening the perception of risks and in citizen mobilization.

2. Theoretical Foundation

This section presents the theoretical and conceptual foundations that underpin the approach adopted in this study, systematizing contributions from socio-environmental justice, CAT, risk communication and educommunicative practices in the context of DRRE. The analysis is based on an understanding of risks as social and historicized constructions, guiding reflection on educational processes committed to transforming vulnerabilities and valuing situated knowledge.

2.1. Socio-environmental justice and the social production of risks

The concept of socio-environmental justice implies recognizing that risks are not neutral but socially produced and unequally distributed. The way they manifest themselves and affect different territories reveals deep-rooted structural inequalities in cities. As Wisner et al. (2015, p. 20) point out, “disasters occur when a hazard encounters a population in a situation of vulnerability”, showing that the impacts result from the interaction between extreme events and unequal social structures.

From this perspective, Beck (2010) allows us to problematize that, in the modernity in which we live, technical-scientific advances, such as intensive industrialization, the indiscriminate use of pesticides, precarious urbanization and energy exploitation based on fossil fuels, produce new forms of threat. These risks, often invisible or not immediately noticeable, such as soil and water contamination, air pollution and climate change, tend to disproportionately affect vulnerable groups, deepening existing inequalities.

As observed by Acselrad (2022), the critical approach to risk recognizes its relational nature, since it stems from political-economic choices that perpetuate exclusions and precariousness. Complementing this perspective, Leff (2009) observes that these situations of exposure are shaped by power relations that conceal institutional responsibilities. Reflecting on socio-environmental justice, therefore, presupposes an understanding that these inequalities are not random, but the result of historical processes that neglect impoverished groups that are systematically excluded from decisions about urban space.

However, as Harvey and Camargo (2014) analyze, the production of

urban space obeys a logic of selective accumulation, which consolidates geographies of injustice and deepens inequalities. Understanding socio-environmental phenomena from this perspective implies overcoming naturalizing views and recognizing them as historical constructions forged in disputes over the use, control, and appropriation of territories (Acselrad, 2010). In addition to this, Guerra et al. (2024) point out that the incidence of these risks tends to increase in contexts characterized by precariousness and lack of public services.

In Brazil, these dynamics are intensified by a development model based on the commercialization of land and unregulated urbanization, which deepens disparities and compromises living conditions and ecological balance in the territories (Vieira et al., 2023; Silva et al., 2024). Faced with this scenario, socio-environmental justice takes on a central role as an ethical and political principle, denouncing the asymmetries in access to common goods, information and participation in the processes that shape ways of life. Far from being mere natural effects, risks reflect structural choices that reproduce historically constituted exclusions and vulnerabilities (Acselrad, 2010).

2.2. Critical environmental education and risk communication

Critical Environmental Education (CEE) is a theoretical-practical approach that interprets ecological crises and social inequalities as manifestations of a development model sustained by dynamics of exploitation, exclusion, and concentration of power (Carvalho, 2017). Based on the critical pedagogies formulated by Paulo Freire, this perspective rejects apolitical or colonizing interpretations of environmental conflicts, treating them as expressions of historical processes marked by economic domination, territorial injustice, and epistemic silencing (Santos & Rosso, 2016).

According to Loureiro (2007), CEE recognizes conflict as a formative element, values different forms of knowledge, and proposes educational practices that integrate individual awareness and collective transformation. Far from normative approaches, it supports dialogical, situated, and politically engaged actions. For Freire (1996), education is a political and unfinished act that mobilizes a critical reading of the world. Guimarães (2004) highlights CEE's commitment to problematizing the contradictions of hegemonic development. Thus, educating also means giving new meanings to nature and progress, strengthening the protagonism of marginalized groups in the construction of plural futures (Ferreira & Richetto, 2025).

The convergence between the CAT and the DRRE enhances educational practices that highlight the structural causes of vulnerability and encourage community participation in the search for answers. More than disseminating protocols, educating for risk means fostering critical engagement, a political reading of the territory and collective forms of care based on local experiences (Jacobi, 2014). As Marchezini et al. (2019) point out, when guided by critical perspectives, ERRD values interactive and contex-

tualized pedagogical practices aimed at building less vulnerable and more resilient societies.

Communication occupies a strategic place in the DRRE, going beyond the simple dissemination of warnings by configuring itself as a space of visibility for silenced experiences and the activation of listening, memory and belonging (Kaplún, 1999). Educommunicative practices, such as audiovisual narratives and affective cartographies, are considered civilizing tools because they reveal risks as social constructions (Soares, 2014). Thus, the adoption of ecological epistemologies that bring together different rationalities (Steil & Carvalho, 2014) amplifies the collective capacity to understand and confront vulnerabilities, making the integration of CAT and reflexive communication practices into DRRE strategies an ethical requirement in the face of socio-environmental inequalities.

2.3. DRRE as a symbolic and political-pedagogical process

The DRRE is an educational process committed to the critical reading of socio-environmental risks as expressions of vulnerabilities historically produced by dynamics of inequality and exclusion (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2005). This concept resonates with the studies by Wisner et al. (2015), which show that disasters are not the result of natural disasters, but of the interaction between threats and social contexts marked by institutional negligence, territorial injustice, and the absence of structuring public policies. Both frameworks converge in recognizing DRRE as a continuous and situated educational practice aimed at building a culture of prevention, co-responsibility, and socio-environmental justice.

The international consolidation of the DRRE was driven by the Hyogo Framework for Action (2005-2015), the first global agreement formulated by the UN to mitigate human, social and environmental losses resulting from disasters (Kelman, 2015). Among its guidelines, the role of education, communication, and knowledge in building a culture of prevention and resilience was highlighted, which favored its incorporation into public policies and school curricula. However, as Saito et al. (2021) point out, its implementation has been strained by structural inequalities, little appreciation of local knowledge and operational limitations in translating proposals into concrete practices.

These impasses led to the formulation of the Sendai Framework for Disaster Risk Reduction (2015-2030), which succeeded and expanded the guidelines of the Hyogo Framework. Unlike its predecessor, it proposes a more integrated and intersectoral approach, involving education, governance, public policies, and social equity (Kelman, 2015). The document emphasizes the strengthening of local capacities, citizen participation in decision-making processes and the centrality of education in prevention strategies, anchored in principles of justice and solidarity.

In this new horizon, the DRRE incorporates the construction of meanings as a constitutive dimension of its pedagogical processes, shifting from a transmissive logic to practices based on listening, dialog, and co-authorship. In accordance with Marchezini et al. (2018), more than informing about dangers, it consists of promoting critical readings of reality, in which risks are understood as expressions of historical vulnerabilities, and subjects as agents of transformation. Communication thus ceases to operate as a simple warning channel and takes on the role of an educational practice aimed at collective mobilization (Wilkins et al., 2021). The construction of meanings thus emerges as a political process of shared elaboration of responses.

This perspective finds support in the culturally relevant pedagogies formulated by Ladson-Billings (1994) and further developed by Larkin (2019), which propose an education rooted in the experiences and identities of communities, committed to racial equity, epistemic plurality, and social transformation. Inspired by these principles, the DRRE expands its critical and emancipatory force, generating conditions for pedagogical practices that are sensitive to life contexts and oriented towards overcoming the structures that sustain exclusion and vulnerability.

Based on these references, the DRRE ceases to be a technical-normative instrument and becomes a space for symbolic elaboration, in which community narratives, affective cartographies and local experiences cease to occupy a peripheral place and become the basis for pedagogical actions sustained by memory, belonging and collective action (Sadler et al., 2013; Windschitl et al., 2020). At this crossroads between DRRE, CAT and emancipatory pedagogies, risk communication is configured as a political-pedagogical process aimed at building shared meanings and activating transformative practices in the face of the historical roots of vulnerability.

2.4. Educommunicative strategies in the DRRE

Educommunicative strategies, based on the inseparability between communication and education, have gained prominence as tools in the construction of training processes aimed at socio-environmental justice and the democratic management of community dynamics (Soares, 2014). Unlike approaches based on vertical transmission, these practices propose dialogical communication relationships, sensitive to local experiences and the multiple languages that make up people's ways of life (Kaplún, 1999).

Within the DRRE, experiences such as school radios, collaborative games, affective mapping, photographic narratives, and participatory videos broaden the circulation of information about risks while activating processes of belonging, collective memory and political engagement. In this key, educommunication acts as a mediation between technical-scientific knowledge and local knowledge, constituting a field of symbolic and material disputes around

ways of living and protecting the territory (Correia et al., 2018; Marchezini et al., 2019).

Internationally, educommunicative experiences in the field of DRRE have revealed multiple possibilities for linking technologies, local knowledge and pedagogical practices that are sensitive to the socio-cultural specificities of each territory. In the Philippines, for example, community digital campaigns¹ have been used to strengthen risk perception in vulnerable coastal areas, integrating oral traditions, local narratives and interactive platforms into horizontal and collaborative training processes (Wisner, 2022). In Japan, disaster simulations incorporated into school curricula operate as spaces for integrative learning², in which technical-scientific knowledge is tensioned by everyday experiences and affective links with the territory.

In the United States, programs such as *Ready Kids*³ and *FEMA for Children*⁴ mobilize playful and participatory languages to encourage collective care practices and community responsibility in the face of disasters from an early age. The experiences show that, supported by active listening, cultural diversity and participation, educommunicative strategies turn risk communication into a sensitive and politically engaged educational process.

In Brazil, although experiences are still incipient, initiatives such as the #AprenderParaPrevenir campaign, coordinated by the National Center for Natural Disaster Monitoring and Alerts (CEMADEN), indicate promising paths. The campaign involves public schools and communities in participatory actions such as interviews with residents, social mapping workshops and the production of school media aimed at the DRRE. This approach encourages active listening, values cultural repertoires and enables the emergence of protagonists in disaster prevention (Ministério da Ciência, Tecnologia e Inovações [MCTI], 2024).

Other relevant experiences have contributed to strengthening pedagogical practices committed to DRRE in different regions of the country. On the coast of São Paulo, the R-ERRD-LN, as mentioned above, develops initiatives in partnership with Civil Defense and CAT projects, establishing connections between risk management, citizen training and socio-environmental justice. In Bahia, the ECOguardiões project combines popular communication and environmental preservation in educational processes centered on community engagement. In Minas Gerais, the ECOS Project invests in training educators with a focus on socio-environmental justice,

1 <https://www.preventionweb.net/publication/participatory-risk-communication-philippines>

2 <https://www.ibe.unesco.org/en/news/japan's-school-based-disaster-education-integrated-approach-resilience>

3 <https://www.ready.gov/kids>

4 <https://www.fema.gov/emergency-managers/individuals-communities/preparedness-activities/children>

while in Petrópolis (RJ), Ecos Comunidade explores the collective memory of disasters as a training tool aimed at prevention.

On a national scale, the actions developed by Cemaden Educação are a reference in the field of DRRE, integrating research, teacher training and territorial interventions in networks involving schools, universities, collectives, civil society organizations, religious institutions and civil defense groups. These collaborative experiences constitute skillful inter-institutional arrangements for connecting technical-scientific knowledge with local knowledge, strengthening educational practices rooted in socio-territorial realities, aimed at increasing the community's capacity to face risks.

Despite these advances, there is a lack of structuring public policies to ensure that DRRE is included in school curricula and to guarantee the financial and institutional continuity of educommunicative practices. Most actions remain restricted to university extension initiatives, research networks or one-off projects linked to civil society and civil defense, with limited territorial reach and high dependence on local leaders.

Given this situation, it is essential to call for the institutionalization of the DRRE from a critical and educommunicative perspective, based on legal frameworks such as the National Civil Protection and Defense Policy (Law No. 12,608/2012) and committed to the principles of the CAT. Beyond one-off or emergency responses, this movement demands a political commitment to citizen education that is capable of cultivating a culture of prevention that is attentive to inequalities and committed to tackling the structural causes of socio-environmental vulnerability.

3. Methodological Path

This study is characterized as applied research, exploratory and descriptive in nature, with a mixed approach, as proposed by Creswell and Clark (2017), whose integration of quantitative and qualitative methods favors a broader understanding of complex phenomena. The focus is on analyzing how environmental communication strategies, using audiovisual resources, can strengthen DRRE in the RMVPLN, based on a case study in Caraguatatuba (SP).

In the first stage, transformations in land use and land cover in the municipality were analyzed based on georeferenced data extracted from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística [IBGE], 2024) and the MapBiomas platform, following the methodology proposed by Souza et al. (2020), for the years 1985, 1998, 2010 and 2022. The classes considered included native vegetation, urbanized areas, agricultural activities and bodies of water. These data were integrated with precipitation information from the CHIRPS v.2 set (Funk et al., 2015), and precipitation extremes calculated with the ETCCDI indicators (Frich et al., 2002; Alexander, 2016), in the 1981 to 2022 period.

The cross-references were made using QGIS software (QGIS Development Team, 2024), enabling thematic maps to be drawn up focusing on the effects of urbanization on drainage and socio-environmental vulnerability.

Based on this diagnosis, the documentary *Da Natureza ao Concreto* (From Nature to Concrete)⁵ was developed, conceived as an educational communication resource aimed at raising awareness about socio-environmental risks in Caraguatatuba. The proposal integrated principles of environmental communication, understood as a formative, dialogical and situated process (Carvalho, 2017), with DRRE guidelines, prioritizing active listening, cultural mediation and the appreciation of local repertoires (Kaplún, 1999).

The production involved environmental researchers and institutional and university communication professionals, ensuring the technical rigor and discursive clarity of the material. The documentary was constructed from 29 slides based on analysis of geospatial data, journalistic records and institutional images, which were then transformed into an audiovisual narrative lasting 3 minutes and 58 seconds. The original soundtrack (*“The Rise”*, by Scott Buckley), animated infographics and thematic vignettes, such as “increasing urbanization”, “soil erosion” and “heavy rainfall in short intervals”, were used as resources to intensify the sensitive connection with the target audiences.

The narrative was based on the “tromba d’água of 1967”, a tragic event that killed hundreds of people on the north coast of São Paulo (Marandola Júnior, 2013). The choice of this collective memory made it possible to contextualize contemporary risks, connecting historical events to current challenges such as changes in precipitation patterns and disorderly urbanization, while also dialoguing with the Sustainable Development Goals, especially SDG 11 (Sustainable Cities and Communities) and 13 (Climate Action), by stimulating reflections on territorial justice, prevention and community resilience.

The documentary was screened at the end of a round table promoted during Environment Week 2024, at a municipal public university in the state of São Paulo. Graduate students, public school teachers and Caraguatatuba City Hall employees ($n = 58$) attended the meeting. The participants answered an instrument made up of four closed questions based on the Likert scale, used to gauge the degree of agreement with certain statements, ranging from 1 (totally disagree) to 5 (totally agree), and one open question. The aim was to capture opinions on the relevance of the content, the clarity of the relationship between urbanization and disasters, and the willingness of the subjects to adopt preventive practices in their daily lives.

Although the research is not based on the classic references of recep-

5 Available at: <https://www.youtube.com/watch?v=1PcKw8tWjTE>

tion studies, it assumes that contact with audiovisual language gives rise to situated interpretations and critical re-significations, offering important clues about the meanings attributed to the proposed narrative. The answers to the closed questions were organized using measures of central tendency, while the open statements were interpreted using the content analysis technique (Bardin, 2016), giving rise to three categories: engagement, criticality and territorial relevance.

The integration of technical-analytical data and communication resources attuned to local realities gave the study an interdisciplinary approach, which intertwines objective evidence and symbolic practices in the construction of meanings about socio-environmental risks. Thus, by combining critical cartographies and sensitive narratives, the proposal tensions normative discourses about the urban, makes silenced inequalities visible and reaffirms the DRRE as a political-pedagogical process committed to social transformation.

4. Results and Discussion

This section presents and interprets the results obtained in the empirical stages of the research, with emphasis on the integrated analysis of Caraguatatuba's geospatial and climatic data, the production of the documentary *From Nature to Concrete* and the formative evaluation conducted with the participants in the educational action. The interpretations are discussed based on the theoretical frameworks that support the proposal, highlighting how the convergence between environmental communication, DRRE and CAT can influence the perception of socio-environmental risks and encourage preventive practices.

4.1. Characterization of the municipality of Caraguatatuba

Located on the north coast of the state of São Paulo, Caraguatatuba is part of the RMVPLN and stands out for its socio-environmental specificities and its strategic position between the Atlantic Ocean and the Serra do Mar (Figure 1). With approximately 111,000 inhabitants spread over 485 km² (IBGE, 2024), the municipality has a territorial mosaic marked by contrasts between areas of environmental protection and expanding urban occupations.

The local geography is strongly influenced by the presence of the Serra do Mar mountain range, which intensifies orographic precipitation and contributes to the environmental fragility of the hillsides. The municipality's rugged terrain, soils susceptible to erosion and increasingly disorderly occupation make it vulnerable to landslides, floods and environmental degradation processes, especially in the coastal plains and on the banks of urban drains (Instituto de Pesquisas Tecnológicas do Estado de São Paulo [IPT], 2016).

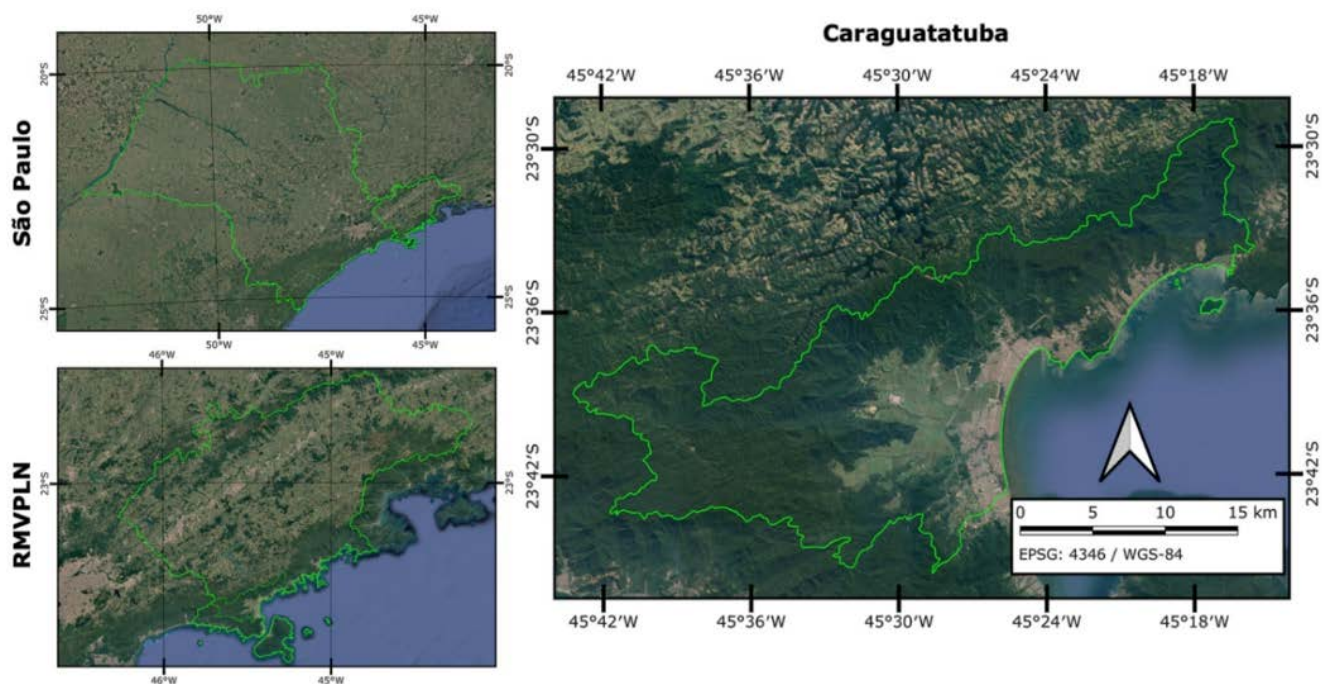


Figure 1
 Geographical location of Caraguatatuba in the context of the RMVPLN.

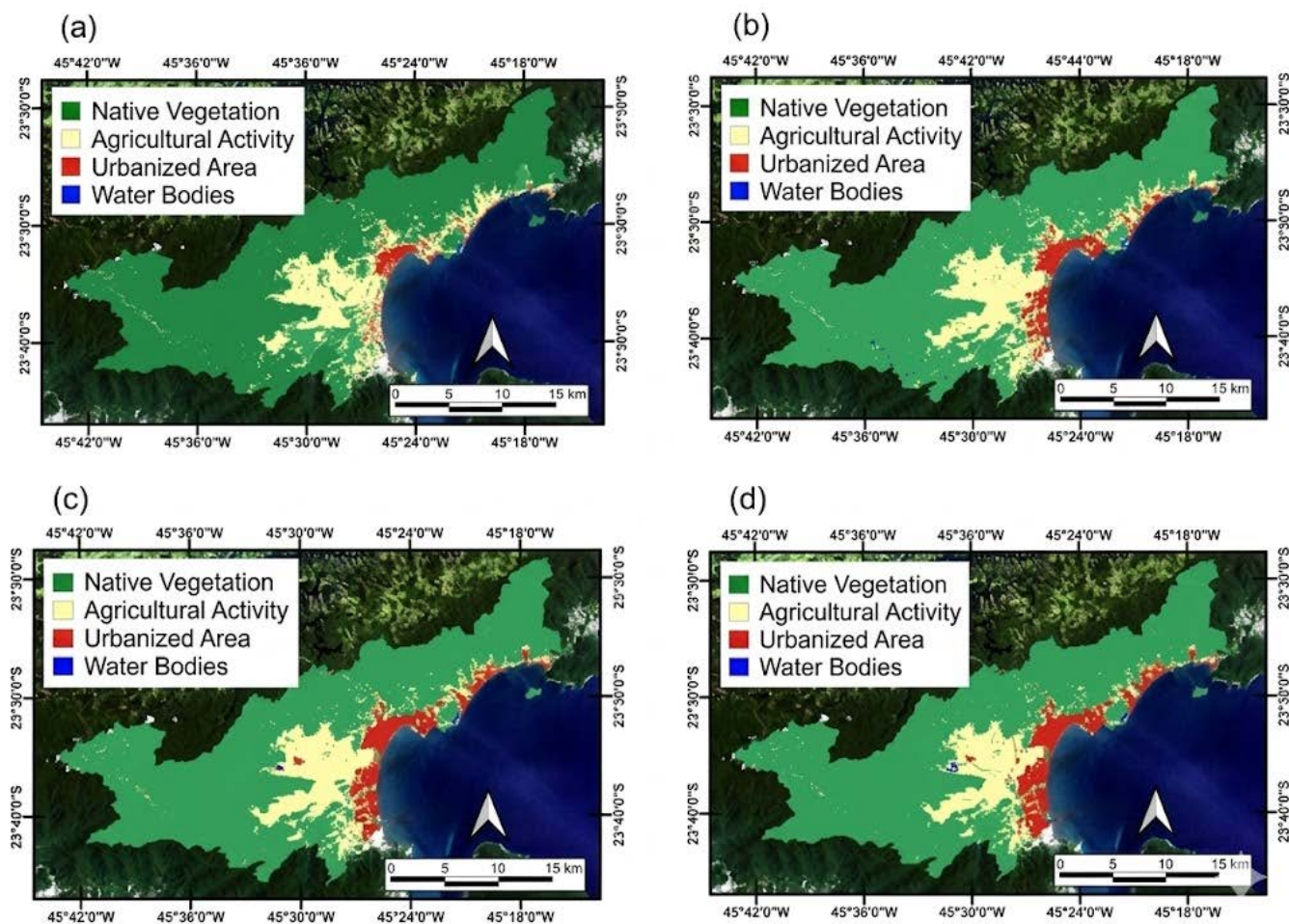
Historically, the urbanization process was driven by the construction of highways and the growth of tourism from the second half of the 20th century, which favored the occupation of environmentally sensitive areas and accentuated socio-spatial inequalities (Teodoro et al., 2021). The installation of strategic infrastructure, such as the Monteiro Lobato Gas Treatment Plant, and the proximity to industrial and tourist centers, intensify the pressures on local ecosystems and aggravate the challenges related to urban sustainability and risk management.

4.2. Drainage and land use maps: vulnerabilities and rainfall patterns

The transformations in Caraguatatuba's territory, observed over the last few decades, reveal much more than physical changes in the landscape: they express modes of occupation, political decisions and historical inequalities that shape the daily lives of local communities. Figure 2 illustrates these changes between 1985 and 2022, highlighting the significant expansion of urbanized areas, which grew by more than 220%, to the detriment of native vegetation and agricultural areas, whose retreat denounces the weakening of ecosystems and traditional ways of life.

This urban sprawl, concentrated on the coastal plains and the slopes of the Serra do Mar, intensifies soil sealing and compromises water resources, increasing vulnerability to floods and landslides. These risks, although aggravated by natural factors, reflect institutional choices marked by a lack of territorial planning and socio-environmental justice.

Overlaying land use and drainage data (Figure 3) allows critical areas to be identified, where urban occupation has imposed itself on protection



zones and watercourses. In these areas, the fragmentation of vegetation compromises essential ecological functions, such as water retention and hillside containment, deepening the vulnerability of the people who live there, often in precarious housing, without access to services or prevention mechanisms.

In addition to anthropogenic pressures on the territory, climate data reveals an additional layer of vulnerability. Figure 4 shows that although the total volume of rainfall throughout the year (4a) remained stable between 1981 and 2022, there was a significant increase in the frequency of heavy rainfall events, especially above 20 mm (4c) and 30 mm per day (4d). In 2022, almost half of the days of the year recorded rainfall of more than 10 mm (4b), while approximately 14% exceeded 30 mm. This concentration of rainfall tends to intensify surface runoff, overload urban infrastructure and aggravate the risk of disasters, especially in areas with high population density and low soil permeability.

The results show that the risks faced by the population of Caraguatatuba do not stem solely from natural phenomena, but from the interaction between extreme weather patterns and a historically exclusionary model of urban occupation, marked by institutional fragility and environmental degradation. Faced with this scenario, the adoption of communication and ed

Figure 2

Evolution of land use and land cover in the municipality of Caraguatatuba in 1985 (a), 1998 (b), 2010 (c) and 2022 (d), showing spatial transformations and occupation patterns over time.

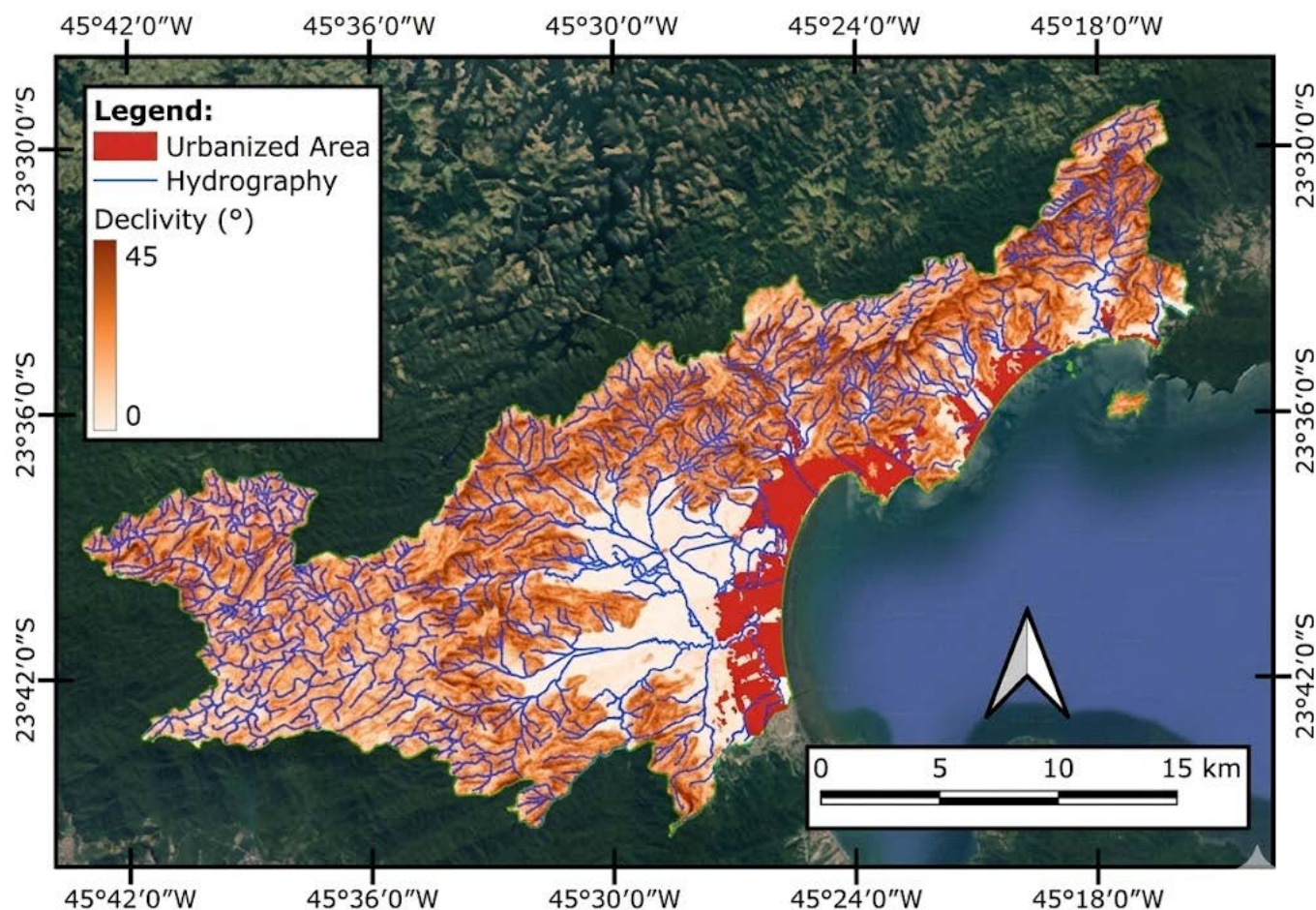


Figure 3
 Overlay of drainage and land use in Caraguatatuba in 2022.

educational approaches that contribute to broadening public perception of the risks, promoting citizen engagement and stimulating collective responses that are guided by territorial justice are becoming more central.

4.3. Formative evaluation and reception of the documentary

The 2024 Environment Week, held at the Litoral Norte campus of a municipal public university in São Paulo, promoted a meeting between academic knowledge, institutional experiences and community demands. With 58 people attending in person, including postgraduate students, public school teachers and Caraguatatuba City Hall employees, and live streaming, the event fostered interdisciplinary debates on sustainability, socio-environmental risks and public policies, in line with the UN's 2030 Agenda.

As the concluding stage of this training process, the documentary *From Nature to Concrete* was screened, designed not to present the audiovisual product, but to instigate critical reflection on the risks affecting the RMVPLN, in the light of the educational and communication strategies explored in its production. For those wishing to learn more about the experience in its entirety, with the dialogues established, the pedagogical developments and the behind-the-scenes mediation, the activity was systematized in a technical

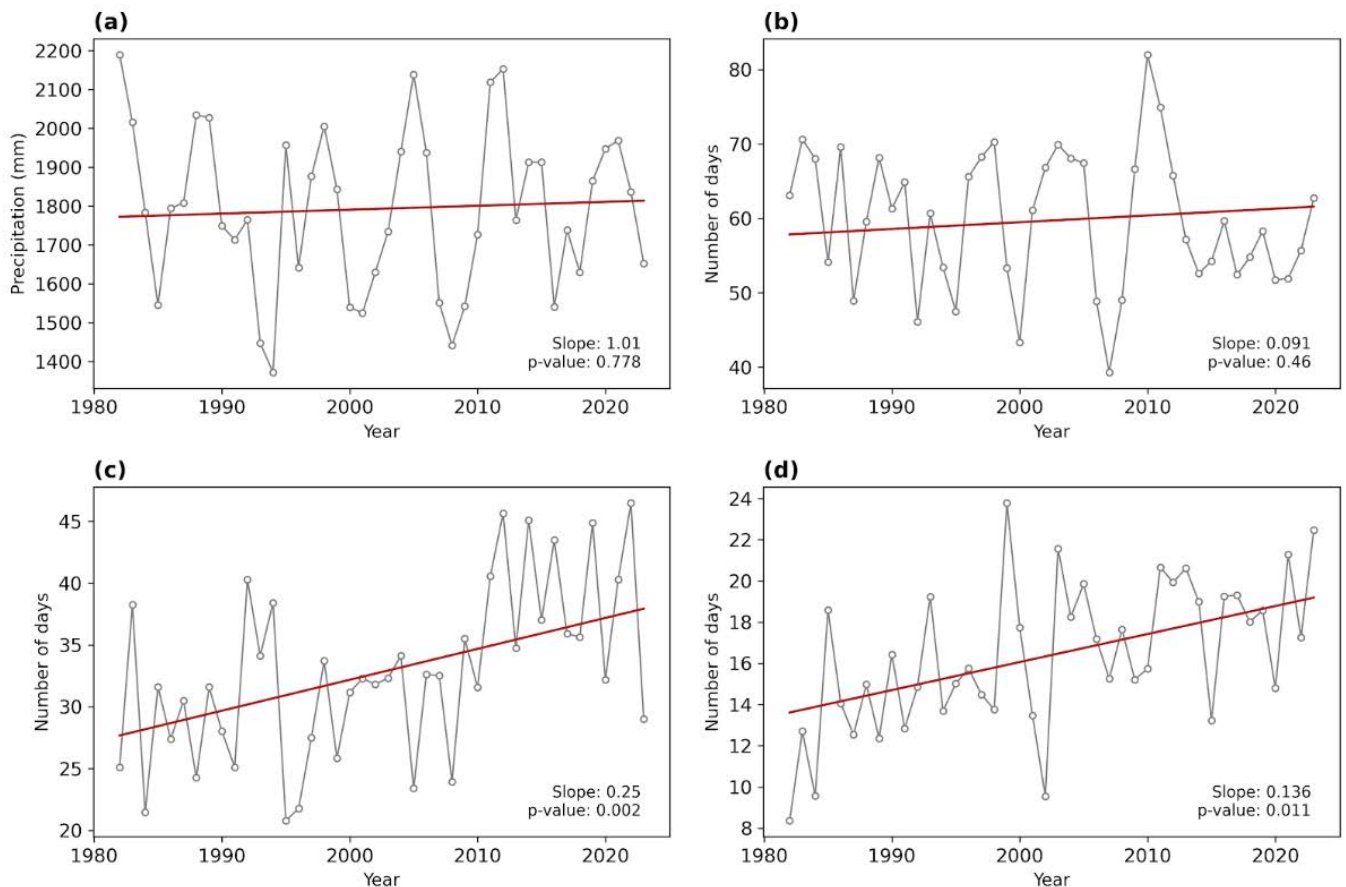


Figure 4

Rainfall trends in Caraguatatuba (1981-2022): (a) Annual sum of daily precipitation greater than 1 mm (PRCPTOT); (b) Annual number of days with precipitation greater than 10 mm (R10mm); (c) Annual number of days with precipitation greater than 20 mm (R20mm); (d) Annual number of days with precipitation greater than 30 mm (R30mm).

article published by Ferreira et al. (2024), reinforcing the relevance of edu-communicative actions in promoting territorial justice.

At the end of the round table, the participants answered a short questionnaire consisting of four closed questions and one open question. The questions used a five-point Likert scale, widely used in evaluation processes in the field of communication and education, to gauge the degree of agreement with statements regarding the clarity of the information, the thematic relevance, the relationship between urbanization and extreme events and the willingness to adopt preventive practices. This evaluative listening sought to capture clues about the meanings attributed by the participants to the audiovisual narrative, helping to understand its reception as a formative, symbolic and situated process.

Figure 5 graphically illustrates the aggregated data, suggesting that the work contributed to establishing meaningful connections between technical-scientific knowledge and the participants' daily lives.

The results shown in Figure 5 show a mostly positive response to the documentary. The predominance of "Agree" and "Totally Agree" responses in the three axes evaluated, risk perception, thematic understanding and intention to adopt preventive practices, suggests that the material succeeded in informing, sensitizing and mobilizing the participants. The data reinforces the effectiveness of audiovisual languages as educommunicative

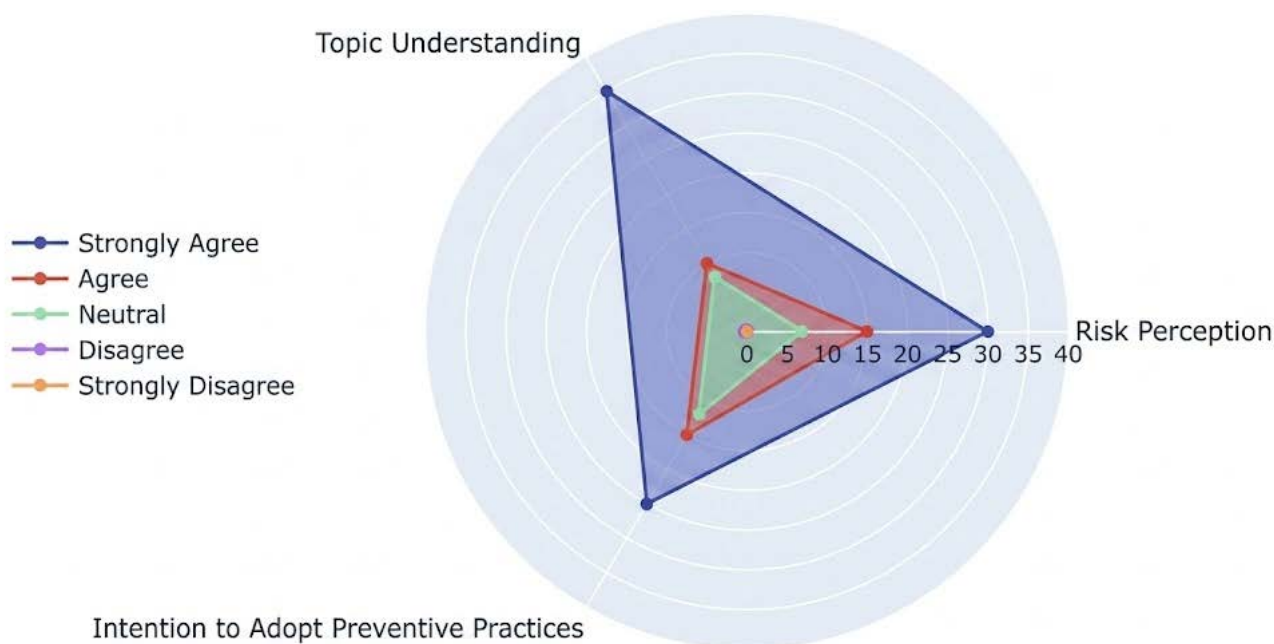


Figure 5

Radar graph with reception patterns for the documentary *From Nature to Concrete*: risk perception, thematic understanding and preventive intent.

tools in the DRRE, especially when guided by CAT principles and based on dialogic approaches.

The open-ended responses were analyzed using the content analysis technique proposed by Bardin (2016), organized into three main categories: engagement, criticality and territorial relevance. Although most of the answers were short and objective, it was possible to identify recurring patterns and categorize the statements based on the presence of cores of meaning shared by the participants. These categories reflect the central aspects of the perceptions expressed in relation to the documentary *From Nature to Concrete*.

In the engagement category, the speeches that stood out expressed an explicit willingness to act in preventive and educational actions. Representative examples include *I realized the importance of actively engaging in prevention, especially in my school and community* (Participant 12); and *the documentary motivated me to discuss these issues with my students and promote more sustainable practices in everyday life* (Participant 37).

As for criticality, there were comments that showed a broader understanding of the structural causes of socio-environmental vulnerabilities. Phrases like: *it became clear that floods don't happen by chance; they are the direct result of disorderly occupation and a lack of urban planning* (Participant 21), and *the video helped us to reflect on how much our daily decisions affect the safety of communities and the environmental balance* (Participant 50), demonstrating the critical reception of the content.

Finally, in the dimension of territorial relevance, many participants recognized the relevance of the material to the local reality: *I felt that the video spoke directly to the challenges of our city, showing real situations that we face here on the North Coast* (Participant 4), and *the approach brought*

elements that help to better understand the specific environmental risks and problems of our region (Participant 27).

The data analyzed shows that the reception of audiovisual content occurs in a complex and non-homogeneous way, influenced by multiple socio-cultural repertoires, various levels of audiovisual literacy and previous experiences of the participants. These factors produce tension between the communicative intentionality of the material and the interpretations actually constructed, which implies sensitive and critical mediation on the part of the educator. Full appropriation of the content depends on the quality of the resource used and on the institutional and pedagogical conditions that favor listening, problematization and dialogue.

Despite the training potential identified, it is important to recognize that the use of audiovisual strategies in DRRE faces concrete limitations in everyday school and institutional life. Among the main obstacles are the lack of continuing education policies aimed at educommunication, the precariousness of equipment and connectivity in public schools, as well as pedagogical resistance to incorporating media languages into the curriculum. These barriers show that the critical integration of audiovisuals into educational practices requires not only well-produced but consistent structural conditions and institutional support.

By combining accessible information, aesthetic appeal and critical engagement, the open responses show the formative potential of the documentary as an educommunicative resource, capable of mobilizing meanings and causing shifts in the field of DRRE. Based on the work of Jacks and Escosteguy (2005), this phenomenon finds support in the theory of media reception, which understands it as a situated social practice, in which historically located subjects with diverse repertoires attribute meanings to messages in an active and contextualized way. In a complementary way, Lopes (2019) points out that this process involves symbolic disputes, allowing content to be critically appropriated and integrated into everyday experiences.

It is therefore understood that the audiovisual proposal functioned as a catalyst for subjective reflections and repositioning, providing clues about the meanings attributed to socio-environmental issues in the context of the RMVPLN. The next section delves deeper into this topic, highlighting the interfaces and intertwining of DRRE, CAT and educommunication as training practices that are ethically and politically committed to the territories.

4.4. Critical interfaces between DRRE, CAT and educommunication

As reported by Ferreira et al. (2025b), the interlocution between ERRD, CAT and educommunication outlines an emerging field of training and communication practices that transcend merely technical approaches or

those that emphasize the direct transmission of knowledge from teacher to student. For the authors, CAT, as an epistemological and pedagogical perspective, rejects neutral or apolitical interpretations of socio-environmental problems, recognizing them as expressions of historical conflicts, territorial inequalities, and the systematic erasure of local knowledge (Guimarães, 2004; Loureiro, 2007). Under this critical lens, DRRE is no longer a one-off response to emergencies, but a permanent, political, and emancipatory educational practice aimed at tackling the structural causes that produce vulnerabilities.

Educommunication is an essential methodology, valuing dialogical, situated, and insurgent educational processes, evoking resistance, confronting oppressive structures, and proposing breaks with hegemonic paradigms. As proposed by Soares (2014), educommunication enhances the protagonism of subjects by breaking with traditional and unidirectional models of communication, favoring discursive autonomy and the collective production of meanings. Initiatives by Cemaden Education and the Environmental Journalism Research Group (GPJA), for example, demonstrate how practices committed to environmental issues contribute to the construction of public spaces for active listening, denunciation, and citizen mobilization, expanding the reach of socio-environmental issues and their social relevance.

In this conceptual and methodological articulation, the documentary *From Nature to Concrete* stands out as a paradigmatic practice that exemplifies the potential of audiovisual strategies in DRRE contexts. By exploring aesthetic and narrative resources that are sensitive to the territorial and historical specificities of the RMVPLN, specifically Caraguatatuba, the work simultaneously calls on technical knowledge, historical memories, and community experiences. In this process, the aesthetic dimension of audiovisuals operated as an affective vector, promoting symbolic approximations and subjective shifts that were fundamental to the participants' critical engagement.

The analysis of the data collected reinforces the formative and political potential of critical reception. As Jacks and Escosteguy (2005) argue, media reception is a situated social practice in which subjects with diverse historical and cultural repertoires actively negotiate the meanings of messages. It is therefore understood that reception is a field of symbolic disputes, allowing for critical and reflective appropriations of communication content. The comments recorded by the participants in this survey confirmed the active and critical nature of the reception, showing identification with the content presented, reflection on the structural causes of local risks and a willingness to make practical and behavioral changes.

It can thus be recognized that these tensions between communicative intent and the meanings attributed by the public are not a flaw in the process, but rather a fundamental characteristic of the educommunicative

practice itself. The polysemy of images and the multiplicity of interpretations make audiovisuals an open symbolic territory, where diverse cultural repertoires, educational backgrounds and world experiences meet, not always in a convergent way.

Active and qualified listening on the part of the educator becomes fundamental, as it allows us to accept dissonant readings, stimulate critical thinking and reframe the audiovisual material in line with the meanings produced by the subjects. This listening, when situated and intentional, transforms the conflict of meanings into formative power, reiterating educommunication's ethical-political commitment to plurality, dialog, and cognitive justice.

Faced with the question that guides this study, it is understood that environmental communication strategies based on the principles of CAT and educommunication reconfigure practices in the DRRE, unveiling the social perception of socio-environmental risks and offering discursive and symbolic repertoires that feed processes of situated reflection. The analyses conducted point to the educational value of educommunicative practices, especially when they enable a meeting between technical knowledge and community experiences.

On this horizon, initiatives that integrate public policies, critical education and the democratization of communication are proving fertile ground for the construction of continuous and transformative pedagogical paths, supported by local competencies in tackling vulnerabilities. At the same time, these strategies strengthen the protagonism of the subjects, calling on them to interpret critically, re-signify their realities and build shared emancipatory paths.

We must recognize, however, the limits of the path taken. The evaluation of the formative reception was conducted in a single moment, with a small group of participants, which restricts the possibility of generalizing the results. It was also not possible to conduct follow-ups to verify the long-term effects of the experiment. Even so, the narratives captured and the symbolic movements observed offer clues about the capacity of certain languages to provoke critical and affective engagement.

As a future perspective, it is necessary to conduct further research in different contexts, understanding how different communities appropriate educommunicative products. At the same time, it is essential to strengthen partnerships between universities, public managers, and local collectives, democratizing the production and circulation of critical educational materials that are accessible and in tune with socio-territorial realities.

More than creating content, it is necessary to establish spaces for reciprocal listening and epistemic co-authorship, recognizing the diversity of knowledge as the foundation of an DRRE committed to cognitive justice and social transformation. Advancing the link between environmental communication, CAT and DRRE is an ethical imperative that calls for the

collective construction of engaged educational practices capable of illuminating vulnerabilities, fostering resistance, and cultivating socio-environmental justice in times of climate emergency.

5. Final Thoughts

The research focused on understanding how environmental communication strategies, based on the principles of CAT and educommunication, contribute to DRRE, broadening the perception of socio-environmental risks and encouraging preventive actions in the Metropolitan Region of Vale do Paraíba and Litoral Norte, with an emphasis on the municipality of Caraguatatuba (SP). Rather than presenting ready-made answers, the research strove to recognize the complexity of the territories and the subjectivities involved.

Along the way, communication revealed itself as a sensitive and situated educational practice, capable of mobilizing affections, awakening reflections, and sustaining bonds, opening up space for the emergence of desires for transformation. The production of the documentary *From Nature to Concrete*, combined with an environmental diagnosis and formative listening, demonstrated how visual narratives rooted in everyday life and collective memory can generate relevant symbolic shifts, especially when connected to lived experiences and shared affections.

From a theoretical point of view, the analysis contributed to deepening the dialog between DRRE, CAT and environmental communication, challenging technocratic and prescriptive approaches. On a pedagogical and social level, the urgency of building educational practices that welcome multiple voices, based on listening, sharing and the collective production of meanings, was highlighted. In this process, audiovisual resources function as mediators between academic and popular knowledge, favoring the creation of cultures of care and social bonds.

The path developed proposes fewer rigid models or definitive solutions and more of an invitation to continue, because there is so much to explore. Future paths involve strengthening partnerships between schools, universities, collectives, and public institutions; creating new educommunicative materials in dialog with different realities; and deepening studies into other languages. There is also an urgent need to enable diverse social groups to tell their stories and collaboratively develop responses to the risks.

We therefore understand that, in times of climate emergencies and structural inequalities, thinking about DRRE from a critical, communicational, and sensitive approach is more than a methodological alternative, it is an ethical imperative. Reimagining educational processes based on listening, affection, and the shared creation of meanings projects fairer horizons, with solidarity and rooted in the experiences of communities in the face of risks and disasters. In this context, the study reaffirms education

as a political practice and an instrument of mobilization in the face of the asymmetries that mark the ways of knowing, narrating, and facing risks.

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