

Risk perception and communication: an analysis of media coverage in high-incidence disaster areas in Santarém, Pará

Percepção de risco e comunicação: análise da cobertura jornalística em áreas de alta frequência de eventos em Santarém-PA

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Abstract: This study critically examines journalistic coverage of disaster events in Santarém, Pará, highlighting how local media shape risk perception in contexts marked by high socio-environmental vulnerability and frequent disaster events. Based on a systematic analysis of Civil Defense (COOMDEC) incidence reports from 2018 to 2021, combined with an evaluation of news articles published by local media outlets, the research identified 176 events predominantly related to hydrological processes, such as flash floods, waterlogging, and inundation events. These events were concentrated in three critical areas of the city characterized by informal settlements and inadequate urban infrastructure, each presenting distinct challenges for risk management. The findings reveal a direct relationship between the occupation of vulnerable zones within the hydrological system – from springs to alluvial plains – and the incidence of disasters. Although journalistic coverage provides valuable technical information and captures the subjective experiences of affected individuals, a selective bias in news distribution is apparent, privileging coverage of central or socially prominent areas at the expense of peripheral regions. This unequal representation normalizes risks and reinforces processes of environmental racism and socio-spatial exclusion, thereby hindering the implementation of effective public policies for disaster prevention and mitigation. Moreover, the research emphasizes the importance of integrating watershed dynamics into urban planning strategies to enhance risk management and strengthen overall urban resilience. The findings underscore the need for a more balanced approach by traditional media – acting as both a transformative agent and a mediator among the various stakeholders involved in risk management – to promote public awareness and mobilize society toward building a safer and more resilient urban environment.

Keywords: risk communication; environmental journalism; environmental racism; civil defense; Amazon.

Resumo: Este trabalho analisa a cobertura jornalística dos eventos de desastre ocorridos em Santarém, Pará, evidenciando a influência dos discursos dos veículos jornalísticos locais na formação da percepção de risco em contextos de alta vulnerabilidade socioambiental e em áreas com alta frequência de eventos. A investigação baseia-se na sistematização dos relatórios de ocorrência da Defesa Civil (COOMDEC), referentes ao período de 2018 a 2021, associado com a análise de notícias publicadas por jornais locais. Foram identificados 176 eventos, predominantemente relacionados a processos hidrológicos, como enxurradas, alagamentos e inundações, que ocorrem em três áreas críticas da cidade. Tais áreas, possuem em comum a presença de ocupações irregulares e a precariedade da infraestrutura urbana, e apresentam desafios distintos de gestão de riscos, evidenciando a relação direta entre a ocupação de zonas vulneráveis dentro do sistema hidrológico – desde as nascentes até as planícies aluviais – e a incidência de desastres. A análise dos dados revela que, embora os veículos jornalísticos tradicionais forneçam informações técnicas relevantes e registrem percepções subjetivas dos afetados, há um viés seletivo na distribuição das notícias, que privilegia a cobertura de áreas centrais ou

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de maior visibilidade social em detrimento de regiões periféricas. Esse padrão contribui para a naturalização dos riscos e reforça processos de racismo ambiental e exclusão socioespacial, dificultando a implementação de políticas públicas de prevenção e mitigação. Ademais, o estudo destaca a importância de incorporar a dinâmica das bacias hidrográficas aos instrumentos de planejamento urbano, de modo a melhorar a gestão dos riscos e a resiliência da cidade. Assim, a pesquisa aponta para a necessidade de uma atuação mais equilibrada da mídia tradicional, que atue como agente transformador e interlocutora dos diferentes atores na gestão de riscos, promovendo a conscientização e a mobilização da sociedade para a construção de um ambiente urbano mais resiliente.

Palavras-chave: comunicação de riscos; jornalismo ambiental; racismo ambiental; defesa civil; Amazônia.

1. Introduction

Media coverage plays a central role in shaping risk perception, particularly in contexts of high socio-environmental vulnerability. In the Brazilian Amazon, few studies have explored the main disaster-generating processes in urban areas and their relationship with the adopted urbanization model (Szlafsztein, 2015). In Amazonian cities like Santarém, where urban expansion often occurs without adequate planning policies and with deficient basic infrastructure, news coverage plays a dual role. It can either foster a culture of prevention by providing relevant information to society and decision-makers, or reinforce narratives that blame the population for creating and exposing themselves to risk scenarios.

Understanding media coverage in risk and disaster contexts requires a conceptual framework distinguishing between “media” and “journalism”. While “media” refers to the array of communication channels – print, digital, radio, or television – “journalism” denotes a professional practice grounded in specific routines, values, and criteria for selecting, producing, and disseminating information (McQuail, 2010; Traquina, 2005). This distinction is crucial because it highlights that not all media information stems from journalistic processes, and that journalism has unique features influencing how disaster narratives are constructed.

Among these features are news values (Galtung & Ruge, 1965; Harcup & O'Neill, 2017), which establish criteria such as relevance, proximity, magnitude, and novelty for selecting events that become news. Applying these values to environmental disasters helps explain why certain events receive extensive coverage while others with similar impacts remain invisible. This mechanism is closely related to gatekeeping, which is the process of selecting, filtering, and prioritizing information that enters or is excluded from the journalistic agenda (Shoemaker & Reese, 1996). This process can be influenced by news values, editorial policies, production routines, external pressures, and the personal perceptions and judgments of the professionals involved (McCombs & Shaw, 1972).

The risk communication literature reinforces that journalistic coverage acts as a mediator among scientific research, public authorities, and society,

directly influencing social perception regarding the severity and urgency of specific threats (Allan, 2002; Glik, 2007). The Social Amplification of Risk Framework (Kasperson et al., 1988) demonstrates that the media can either amplify or attenuate public risk perception depending on how it selects, frames, and contextualizes information.

Regarding environmental disasters, studies indicate that coverage tends to favor visually striking episodes in areas of higher social and economic visibility, whereas peripheral regions or vulnerable populations receive less attention (Loose & Girardi, 2017; Belmonte et al., 2014). This pattern of unequal visibility aligns with the concept of environmental racism (Acselrad, 2004; Pellow, 2016), highlighting how socially marginalized groups are disproportionately exposed to risks while being underrepresented in media coverage.

Therefore, analyzing media coverage of risks and disasters requires understanding the logic of journalistic production and the discursive frameworks shaping public perception. Based on this perspective, the present study links the characterization of events and the spatial mapping of disasters in Santarém, PA, with a theoretical reflection on journalism's role in risk communication. This approach aims to reveal both the technical dimensions and the narratives structuring the visibility – or invisibility – of these events.

2. Methodology

2.1. Study area

This research was conducted in the city of Santarém, located in western Pará State (Figure 1). The municipality is the most populous in the Lower Amazon region and the third most populated in the state (Pereira, 2004), covering an area of approximately 17,898.39 km² with 331,942 inhabitants (Brazilian Institute of Geography and Statistics [IBGE], 2022).

The city's settlement is tied to the Tapajós and Amazon rivers, serving as a critical waterway convergence point for developing various extractive activities (Aguiar, 2017). The predominant climate in the municipality is humid tropical, influenced by the equator, with mean annual temperatures ranging from 25°C to 28°C (Alvares et al., 2013; Silva et al., 2016). The region features two well-defined annual seasons: the rainy season, or Amazonian winter, occurring from December to May, and the dry season from June to November (Costa et al., 2013; Santos et al., 2018; Santos et al., 2021).

2.2. Data collection and analysis

This study employed a mixed-methods approach (combining qualitative and quantitative techniques), integrating the principles of content analysis (Bardin, 2011) and *framing analysis* proposed by Entman (1993), based

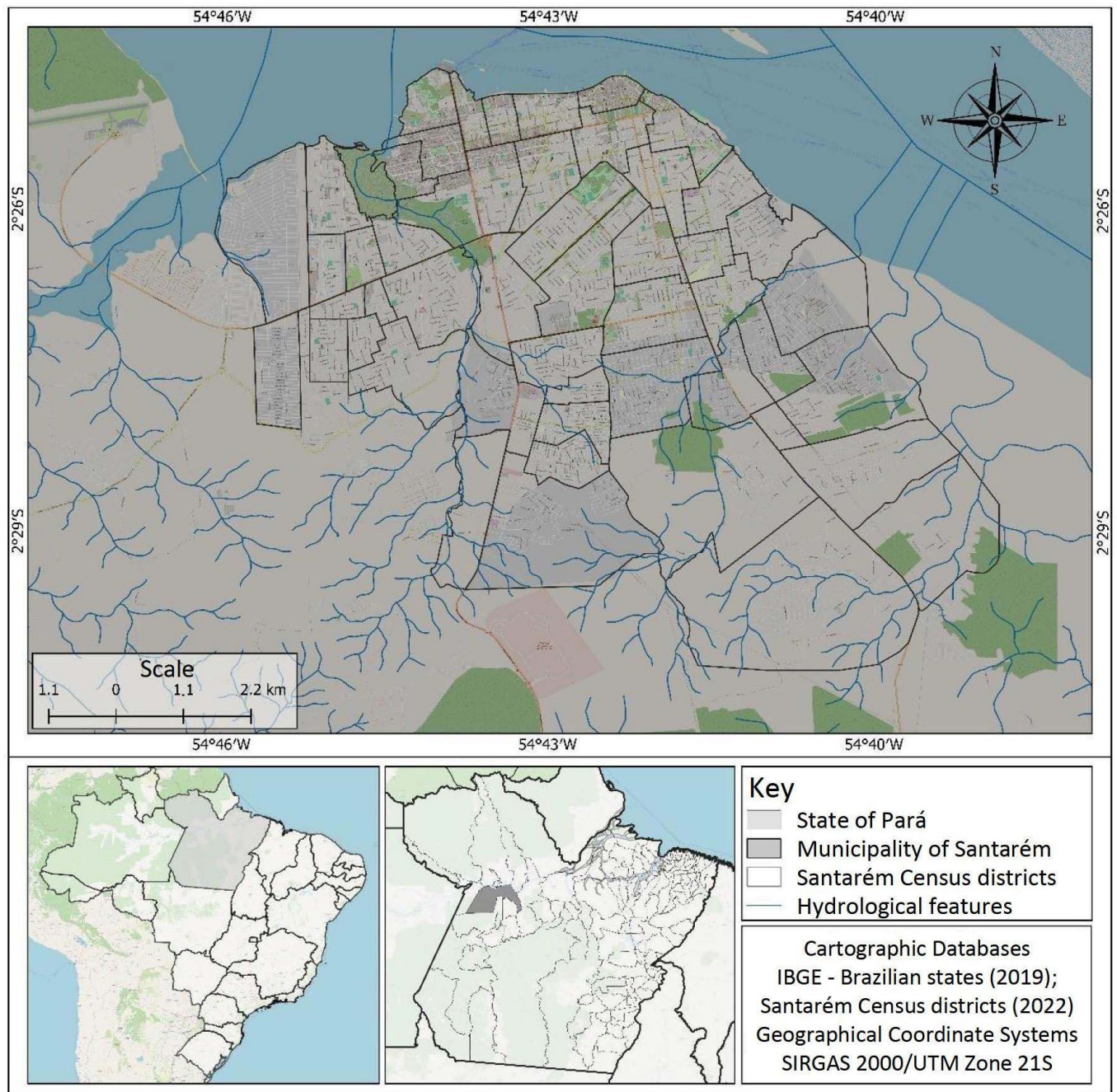


Figure 1
 Location of the study area.

on journalistic concepts such as *gatekeeping* (Shoemaker & Reese, 1996) and news values (Galtung & Ruge, 1965; Harcup & O'Neill, 2017). Figure 2 presents the methodological stages of the study, from data collection to analysis.

The initial analytical universe comprised news articles from three traditional local media outlets (G1 Santarém, O Impacto, and O Liberal) published between January 2018 and December 2021 containing at least one of the following keywords: “rain”, “waterlogging”, “flash flood”, “flood”, “landslide”, “risks”, and “disasters”.

After collection, the articles were screened using the following inclusion criteria:

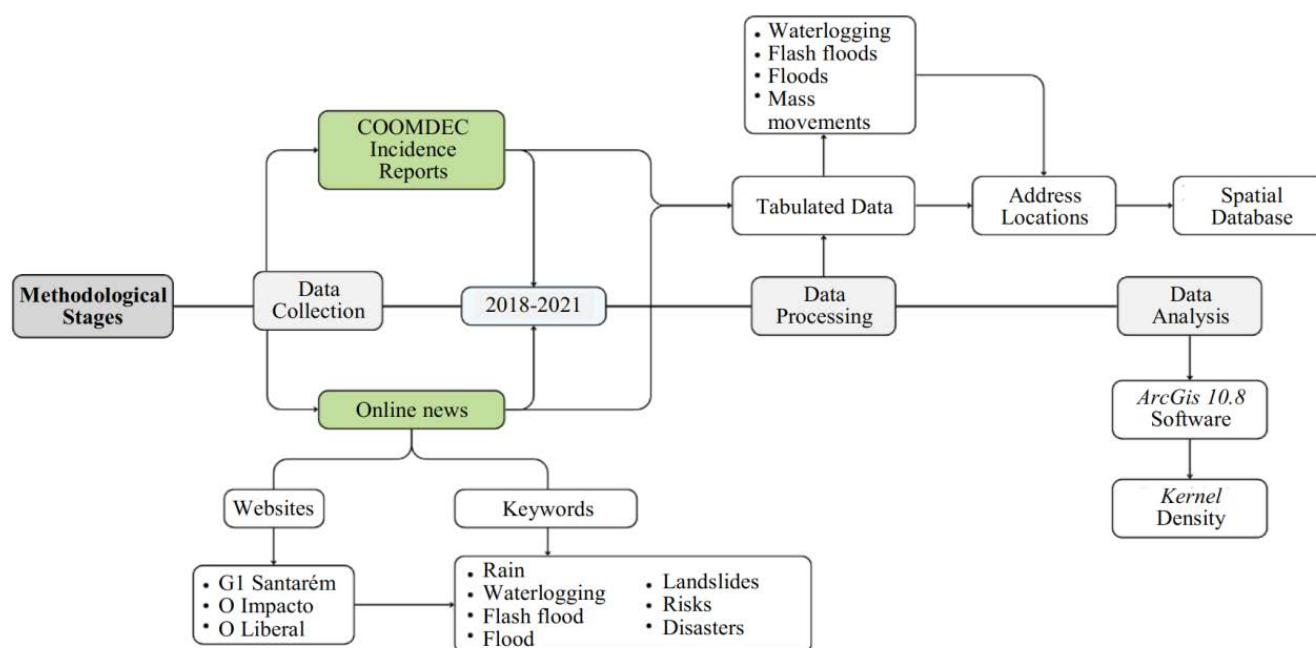


Figure 2
 Methodological flowchart showing data collection and analysis.

- The text must report an event associated with natural hazard or disaster in the municipality of Santarém, PA.
- It must contain verifiable location details (neighborhood, street, or landmark) to enable georeferencing.
- It must present information regarding impacts, response measures, or statements from authorities, experts, or residents.

Articles were excluded if they:

- Merely reproduced weather forecasts or official statements without local context.
- Mentioned events in neighboring municipalities unrelated to Santarém.
- Were limited to indirect citations of events lacking descriptive data.

Content reading and categorization were performed via manual coding with double-checking to minimize interpretation bias. This step allowed us to quantify the distribution of news within the urban space while elucidating predominant narrative patterns and frameworks. Linking this analysis with the theoretical framework enabled us to identify asymmetries in event visibility and discuss how local journalistic routines and values influence the public construction of risk perception.

Data were also collected by surveying and filtering incidents using “Incident Reports” from the Santarém Municipal Civil Defense Coordination (COOMDEC) for the 2018–2021 period. These reports are generated for every emergency response and contain information such as the incident address, date, and the specific risk or disaster event. All COOMDEC reports were made available through a technical cooperation agreement.

Data from physical Civil Defense reports were tabulated and filtered; only notifications regarding waterlogging, flash floods, floods, and mass movements were retained for analysis. Notifications related to fallen trees and similar events were excluded. The addresses from the COOMDEC incident reports were geolocated using *Google Earth* and used to construct a spatial database.

The incidents detailed in the news articles were georeferenced using the same procedure applied to the COOMDEC data. In both datasets, attribute tables were enriched with keywords for event classification alongside additional contextual information when available.

Spatial analyses and the generation of final maps were performed using ArcGIS 10.8 *software*. To identify areas with the highest event occurrence, we used COOMDEC data and applied a Kernel density estimation to the data points. The results were then classified into quartiles to define frequency classes.

3. Results and discussion

During the analyzed period, 176 disaster-associated events were recorded in the COOMDEC reports. Most of these incidents involved hydrological events, such as flash floods, waterlogging, and floods, concentrated in the region's rainiest season (November to April). Systematizing and mapping these reports can play a crucial role in shaping prevention strategies and improving response actions. Figure 3 maps the distribution of high-frequency event areas across the study years and the locations of the news reports concerning these events. The event frequency mapping identifies three main areas within the city with the highest concentration of disasters, distributed across distinct urban zones. The findings also reveal how unplanned urban settlement creates diverse risk scenarios along various drainage segments, from the headwaters to the alluvial plain.

Area 1 (Vitória Régia) is characterized by the settlement of the headwater area of the Irurá Igarapé (stream), leading to severe erosive hotspots driven by strong flash floods and residential flooding. This area lies within a densely populated urban zone (Nova República). Andrade and Szlafsztein (2018) reported moderate to high vulnerability throughout this area, while the CPRM risk zoning distinctly highlights the precarious condition of streets and housing exposed to the highest event occurrence zones.

Area 2 (Santarenzinho/Aeroporto Velho) is situated on the slopes of the middle course of the Irurá igarapé. Events here are primarily linked to flash floods and waterlogging. Furthermore, regions on the eastern bank of the igarapé face mapped mass movement risks due to hillside settlement, while western bank housing is prone to inundation. According to the CPRM (Fonseca, 2021), zoning assessment, 315 properties were identified at risk, ranging from high to very high for landslide and inundation pro

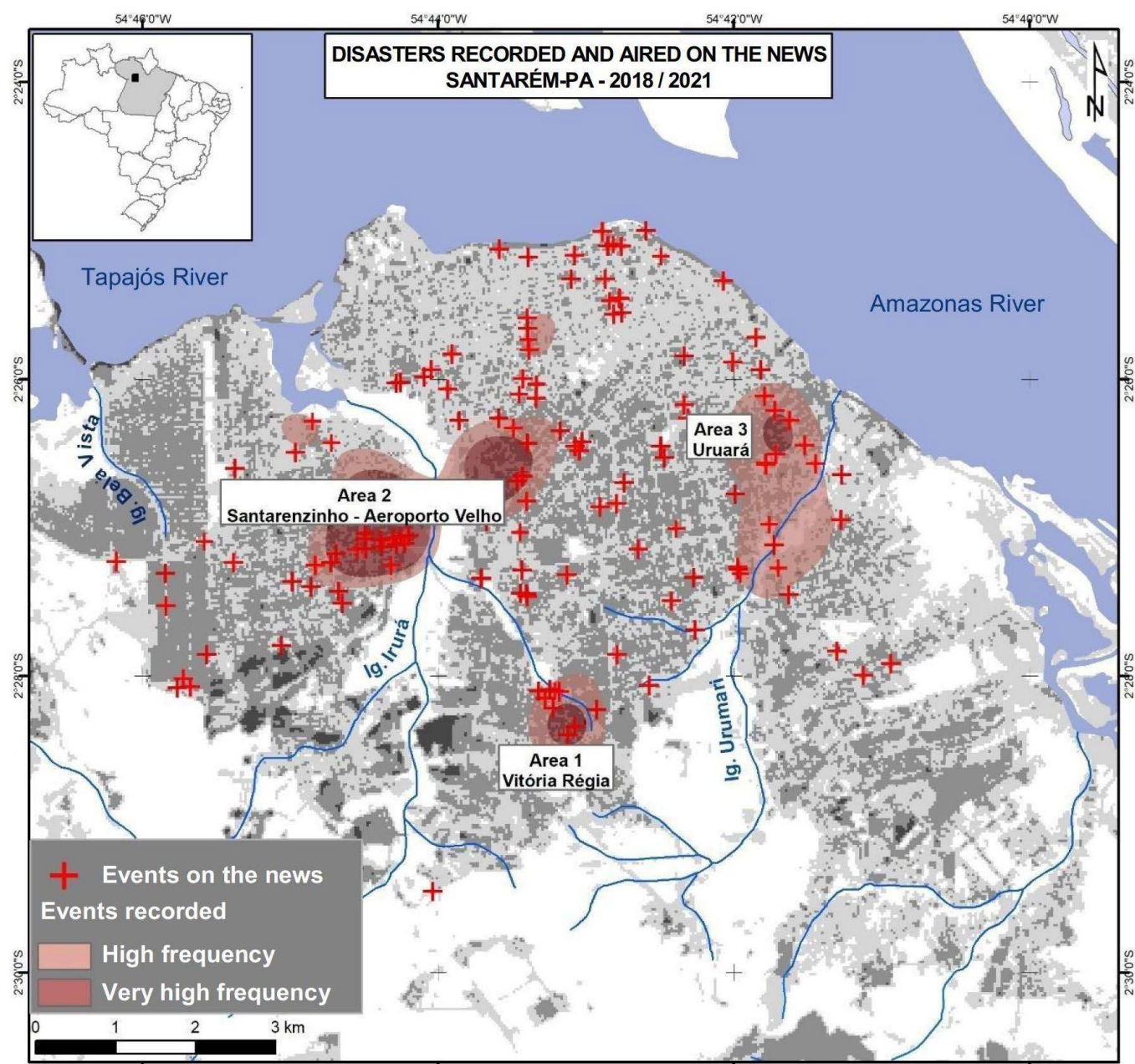


Figure 3

Distribution of documented disaster-associated event frequencies and reported events between 2018 and 2021 in the city of Santarém.

cesses, exposing over 2,000 people. Andrade and Szlafsztein (2018) identified varying vulnerability levels in the neighborhoods comprising this area, with most exhibiting a moderate degree of vulnerability. Cortes and Less (2024) analyzed urban growth from the perspective of the Igarapé Bela Vista watershed in the city's western zone, noting that the creation of precariousness, along with increasing risks, is embedded into the city well before the installation of basic infrastructure. Importantly, Santarém's western zone currently represents the municipality's most intense axis of urban expansion.

Area 3 (Uruará) is situated along the banks of the Urumari stream and encompasses the Uruará neighborhood and its surroundings. In this area, events are also linked to the hydrological dynamics of the Amazon River,

which floods the Urumari plain during the high-water season. Steeper areas also experience strong flash floods, particularly on streets running parallel to the slopes, driven by the absence or inadequate scaling of urban drainage systems. This region shows a more intense settlement in the Urumari stream plain compared to the Irurá plain, resulting in a broader spatial distribution of disaster events. This contact zone between the Urumari and Amazon plains is classified as highly vulnerable (Andrade & Szlafsztein, 2018). Furthermore, the CPRM risk zoning highlights that most homes especially along Transmaicá Avenue, are built on landfilled floodplain areas. This reduces the floodplain's water retention capacity, spreading inundations and expanding flooded areas. Stilt houses (*palafitas*) and wooden homes are highly frequent in this area.

Interestingly, the city's main disaster event hotspots correspond to three hydrological drainage segments: headwaters (Area 1), main course (Area 2), and mouth (Area 3). Each exhibits distinct settlement characteristics and impacts, thus requiring tailored risk management strategies. Moreover, these areas reflect different urban dimensions concerning settlement types and periods, housing patterns, and so forth. In all cases, however, the lack of infrastructure and planning – along with the invisibility of hydrological dynamics – consistently drives the creation of chronic risk zones.

3.1. Understanding the events

Media reports can aid in understanding technical aspects of disaster events, such as triggering climate systems, distribution, and duration, through expert consultation, primary data collection, and dialogue with affected populations. Beyond documenting events, media coverage serves as a mediating mechanism between local experiences and the broader public sphere (Allan, 2002; Glik, 2007). The selection and presentation of events reflect news values that favor episodes with strong visual impact, brief duration, and easy journalistic access (Galtung & Ruge, 1965; Harcup & O'Neill, 2017). These criteria explain why events in high-traffic areas with more dramatic imagery receive greater prominence in Santarém, even when peripheral areas face recurrent risks. Such prioritization directly influences public risk perception, reinforcing the agenda-setting effect (McCombs & Shaw, 1972), whereby more frequently reported topics and locations are perceived as more important.

In addition to reporting facts, news articles help reconstruct historical patterns of disaster events (Pereira et al., 2014), serving as tools to detail and analyze damage extent. They also facilitate the identification of vulnerability patterns and narratives surrounding these events while prompting public responses. Belmonte et al. (2014) argue that risk intrinsically harbors strong news potential, establishing risk as a news value in environmental journalism, both regarding future negative impacts and the search for mitigating solutions. When addressing environmental risks,

journalism not only informs the public about imminent threats but can also raise awareness and mobilize mitigation efforts.

Figure 4 highlights two situations reported in Area 3 (Uruará). Figure 4A notes that Santarém accumulated 177 mm of rain in 7 hours, causing waterlogging in a hospital, homes, and city streets. The article in Figure 4B describes 12 hours of heavy rainfall, triggering flash floods that damaged streets and inundated houses. Both reports provide details on the triggering hydrological event, specifying rainfall duration and volume. This preserves data that can help clarify the conditions instigating disasters in a given region.

Another crucial media role involves prompting decision-makers and placing risk management topics on the agenda, as discussed by Loose & Girardi (2017). In this regard, examples are less frequent than desirable. Media rarely coordinates with the various actors involved in municipal management, including the executive and legislative branches, departments of urban planning, infrastructure, environment, and housing, as well as COOMDEC itself.

Figure 5A illustrates an article employing this approach. It records a statement by the acting mayor highlighting the need for a municipal drainage plan and provides objective data on the city's drainage problems (65 critical points spread across 22 neighborhoods). Notably, the article fails to mention Santarém's Municipal Basic Sanitation Plan 2020-2023 (Prefeitura Municipal de Santarém, 2019), the document intended to guide related infrastructure development in the city. Figure 5B shows a televised report inviting an expert to explain the atmospheric factors linked to a major precipitation event. The involvement of the technical and scientific community in

Figure 4

(A and B) – Examples of text and image information from disaster-related news surveys.

SOURCE: G1 Santarém (2020; 2022).

VÍDEO: Santarém recebe 177mm de chuvas em 7 horas, e registra alagamento de hospital, casas e ruas

De acordo com levantamento realizado pela Universidade Federal do Oeste do Pará (Ufopa) na Estação da Cernaden instalada no bairro Mapiri, as chuvas foram registradas de 21h de segunda (21) até 04h40 da manhã desta terça (22). No total foram 177 milímetros, deixando a cidade em alerta vermelho.



A

Chuva forte em Santarém causa alagamento em casas e enxurrada provoca crateras em ruas

Fenômeno foi causado por instabilidade atmosférica na região e durou mais de 12 horas.



B

Foram cerca de 12 horas de chuvas, que iniciaram ainda na noite de sábado (22) e seguiram até o início da tarde de deste domingo (23). Conforme o coordenador da Defesa Civil Municipal, Darlison Maia, os registros de casas alagadas foram nos bairros Jutai (3), Amparo (6) e Maracanã (3), além de um muro que cedeu no bairro Conquista.

Prefeito em exercício fala sobre estragos da chuva em Santarém 'solução é criar um plano de drenagem'

Reunião emergencial reuniu órgãos do Governo nesta terça-feira (27). Forte chuva provocou enxurrada e estragos em vários bairros.



A

De acordo com a Defesa Civil Municipal, em 22 bairros existem em média 65 pontos considerados críticos que causam problemas a cada chuva. A Defesa Civil disse ainda que só nesta terça-feira, foram 65 chamados.

B



such cases is highly desirable to help improve society's perception of these events. Veyret (2007) notes that between the two main groups in risk scenarios – civil society and managers – lies the media. It “plays an important and active role in constructing perceptions of risk, since certain perceptions, such as the magnitude of mobilizations and alerts, largely depend on them” (Veyret, 2007, p. 126).

Media mediation is essential for publicizing scientific work and socio-political decisions, ensuring the population receives the information needed to confront such risks (Loose & Girardi, 2017). Thus, building this perception requires dialogue among different actors involved in risk management. Local news outlets must handle this responsibility carefully, engaging both the formal and informal institutions that shape policy formulation and implementation (Ahrens & Rudolph, 2006).

3.2. Understanding and assessing impacts

Another crucial aspect revealed by the news analysis was the ability to understand and assess event impacts on affected individuals and the city, particularly regarding damage to public facilities and infrastructure. These impacts can trigger both immediate and long-term consequences, including material damage, displacement needs, and psychological trauma, among others. In urban settings, such events can damage roads, streets, bridges, hospitals, and schools, thereby compromising the city's functionality and the population's quality of life. Importantly, broadly speaking, the Amazon region contains municipalities highly vulnerable to these impacts (Instituto de Pesquisa Econômica Aplicada [IPEA], 2015).

Media coverage provides valuable insights to understand not only physical damage but also subjective impacts, such as fear, insecurity, and stress. By incorporating residents' statements and emotional accounts, local journalism functions according to the logic of social risk amplification (Kasperson et al., 1988), where certain individual experiences are amplified to acquire col-

Figure 5

The media acting as interlocutors between different risk management sectors and society: (A) Municipal managers and (B) Experts.

SOURCE: G1 Santarém (2018; 2020).

lective relevance. However, selecting which voices are heard also undergoes *gatekeeping* (Shoemaker & Reese, 1996). This process may favor sources that reinforce specific narratives – such as individual blame or an emphasis on short-term solutions – over structural explanations tied to a lack of urban planning.

Table 1 presents perceptions recorded in news reports concerning events in the most critical areas identified. These accounts reveal both subjective aspects (feelings) and objective aspects of the events (facts). In this sense, statements from affected individuals become vital records for deepening the data provided by incident reports and broader-scale assessments.

Table 1 Testimonies from individuals affected by disaster events in critical areas of Santarém, highlighting subjective and objective impacts.

Areas	Statements	Impactos	
		Objective	Subjective
Area 1 – Vitória Régia	“For eight years we have lived as castaways; every year, I am afraid my house will be washed away by the flash floods. It makes us sad; my grandchildren can’t even go to school when it rains in the morning. No cars, motorcycles, or even pedestrians can pass; the street turns into a river”.	Routine interruption, access restriction, exposure to wastewater	Fear, sadness, insecurity
Area 1 – Vitória Régia	“It was a moment of despair. We heard a crash, and when we looked in the backyard, the wall was already on the ground. Water flooded the house; my granddaughter helped me lift some things, but it was a huge loss”.	Material losses to personal belongings and housing structures	Despair, fright, grief
Area 2 – Santarenzinho / Aeroporto Velho	“After the paving work, when it rains, it floods about 30 cm deep. It’s hard to pass by motorcycle, let alone walking; you can’t even see the ground”.	Access restriction, exposure to wastewater	Isolation
Area 3 – Uruará	“When the rain started and I saw it was going to flood, I began lifting everything I could, but there was no time. We lost the washing machine and the sofa, but my children’s lives and my own were saved”.	Material losses to personal belongings	Stress, despair, grief, relief

Another significant angle observed in the news relates to risk management perspectives, illustrating general societal perception through the statements of residents, experts, and authorities. Table 2 presents exam-

ples of criticisms and observations regarding the city’s disaster event situation. Overall, the statements indicate the existence of structural problems and the municipal administration’s limited capacity to manage chronic issues like the lack of urban drainage and the inefficiency of planning tools. These problems stem from a limited perception of the natural factors that escalate risk, such as slope morphology and drainage network distribution amid disorganized settlement. Furthermore, this dynamic tends to perpetuate as new urban expansion fronts follow the same logic of “unplanning”, as demonstrated by Cortes and Less (2024).

Table 2 Perception of different actors regarding risk-related problems in Santarém.

Interviewees	Statements	Link/Source
Resident	“Santarém is a city in the heart of the Amazon. The rains are harsh. The city hall needs to start a project and finish it. Moreover, paving just for the sake of paving amounts to negligence. Infrastructure for rainwater drainage is necessary”.	https://oimpecto.com.br/2018/02/27/chuva-intensa-provoca-alagamentos-em-ruas-comercios-e-residencias/
Reporter	“Old problems reappear, such as poor drainage on paved streets and the lack of storm drains and culverts on most city streets”.	https://g1.globo.com/pa/santarem-regiao/noticia/2020/02/22/enxurrada-causa-estragos-em-diversos-bairros-de-santarem.ghml
Urban planning expert	“Santarém is not prepared to absorb so much rainwater; our city lacks a drainage system that can handle this situation. We need planning”.	https://globoplay.globo.com/v/6537571/
Mayor	“The city has over 300,000 inhabitants, is 356 years old, and does not have a municipal drainage plan”.	https://g1.globo.com/pa/santarem-regiao/noticia/prefeito-em-exercicio-fala-sobre-estragos-da-chuva-em-santarem-solucao-e-criar-um-plano-de-drenagem.ghml

The statements in Table 2 demonstrate a well-developed understanding of the need to regulate stormwater within the city. Simultaneously, they reveal a poor understanding of the importance of natural drainage systems, including streams and headwaters. This relationship has been noted more broadly (Carvalho & Leite, 2013) and discussed by Mendes and Cortes (2022) concerning Santarém. Defining the three critical areas in this study, however, points to a direct link between these events and the occupation of hydrological system features, including slopes, headwaters, and floodplains. These data underscore the importance of strengthening watershed-based planning and societal perception of these natural drainages to prevent or regulate the settlement of sensitive areas.

Figure 6 illustrates the damage sustained in Area 3 (Uruará) due to the settlement of floodplain terrain and slopes along the final stretch of the Urumari stream. These events evidently harbor high impact potential at the household level, causing material losses to residents (Figures 6A



and 6B), and at the municipal level, damaging streets and public facilities (Figures 6C and 6D).

3.3. Media coverage of risks and environmental racism

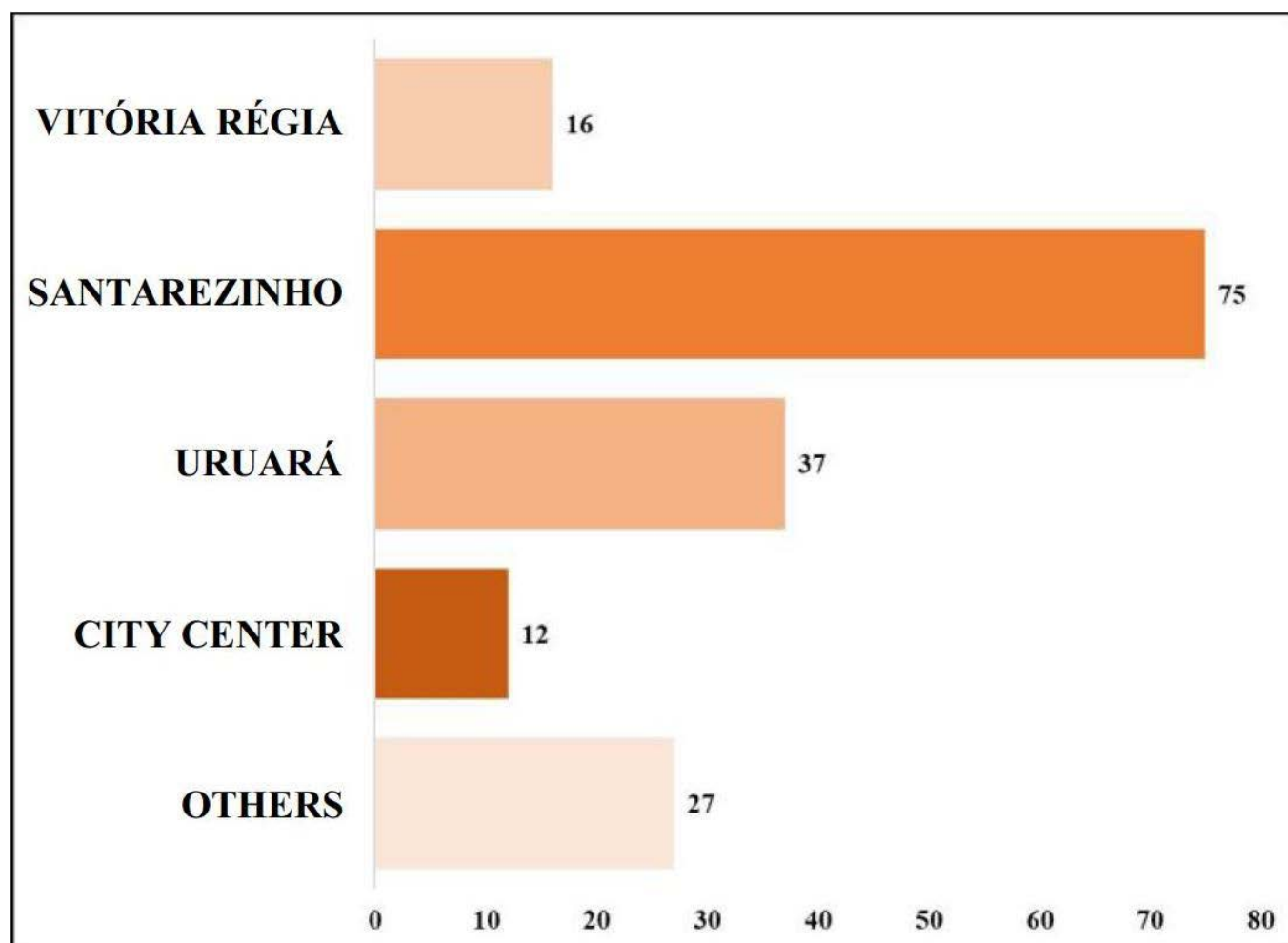
Analyzing journalistic coverage of risk events in Santarém identified 148 articles meeting the selection criteria between 2018 and 2021. Of this total, 45% referred to Area 2 (Santarenzinho/Aeroporto Velho), 30% to Area 1 (Vitória Régia), and only 16% to Area 3 (Uruará), despite the latter experiencing a high incident frequency according to COOMDEC data. Other city regions, particularly those on the periphery and farther from the center, were mentioned in only 9% of the articles, even when recording events with substantial impacts. Figure 7 displays the distribution of news reports linked to the analyzed events, categorized by the highest frequency incident areas and other city regions.

The data indicate that over 75% of the news is concentrated in the areas with the highest event incidence, which initially suggests coverage proportional to disaster distribution. However, analyzing the specific distribution within this group reveals a selective attention bias.

Figure 6

Impacts and consequences of heavy rains on residences (A and B) and public facilities in Santarém (C and D).

SOURCE: G1 Santarém (2019).



Approximately 45% of the articles report events in Area 2 (Santarenzinho/ Aeroporto Velho), a sprawling and densely populated region experiencing recurrent hydrological impacts due to its topography and inadequate drainage conditions. This area's dominance in news coverage can be explained not only by the sheer volume of recorded events but also by the social visibility of the incidents, which frequently disrupt public infrastructure and urban traffic. Conversely, event and coverage concentration in Area 1 (Vitória Régia) reflects a different dynamic. Here, floods and landslides are more intense and localized, directly driven by the settlement of headwaters and steep slopes. Meanwhile, Area 3 (Uruará), located on the floodplain, shows a more dispersed pattern of reported events. These are often linked to slower and more prolonged flooding events, likely contributing to reduced media attention.

Excluding the highest disaster concentration zones and the city center reveals that only 16% of the news covers other regions of Santarém, underscoring a clear journalistic coverage deficit in these localities. Furthermore, analyzing the distribution between the center and other neighborhoods uncovers a significant disproportion: although the city center logs relatively few incidents, it commands 30% of the news coverage. This disparity reflects the region's economic and political centrality; impacts here resonate

Figure 7

Number of event-related news articles across high-frequency areas, the city center, and other neighborhoods in Santarém, PA.

more deeply within urban dynamics, yielding greater visibility in both media and government actions.

The identified coverage asymmetry, where central and socially visible areas receive disproportionate attention, can be explained by the interplay between news values and gatekeeping. These factors favor events offering higher repercussion potential and easier logistical access for reporters. This dynamic reinforces uneven visibility patterns echoing the literature on environmental injustice (Acselrad, 2004) and environmental racism (Pellow, 2016), wherein low-income populations and peripheral residents are systematically underrepresented. Consequently, risk becomes naturalized in these regions, resulting in diminished social mobilization and lower priority on public agendas – an effect directly tied to the press's social construction of risk perception.

Cortes and Less (2024) argue that the marginalization of Santarém's peripheries legitimizes an urban growth model detached from planning tools, spurring real estate speculation and exacerbating precarious housing conditions for vulnerable populations. Thus, the lack of adequate infrastructure and recurrent exposure to extreme events are not merely consequences of haphazard growth. They also stem from an active socio-spatial exclusion process that relegates specific social groups to high-risk areas.

Ferreira et al. (2022) highlight that continuously exposing peripheral populations to unsafe environments not only deepens urban inequalities but also perpetuates intergenerational vulnerabilities, hindering the development of effective resilience and adaptation strategies. Silva and Braga (2016) point out that the dichotomy between environmental and social issues obscures the differential impacts of disasters, impeding the implementation of equitable public policies. In the Amazonian context, historical settlement patterns reinforce this socio-spatial segregation. Higher-income groups occupy central and elevated areas, while low-income populations are progressively displaced toward floodplains prone to inundation and precarious urban services.

Therefore, unequal media coverage and the disproportionate allocation of public attention reflect an environmental injustice pattern that directly undermines disaster prevention and response policymaking. Prioritizing certain areas in news coverage not only skews social mobilization and resource allocation but also normalizes vulnerability in peripheral neighborhoods. Here, recurrent events and inadequate infrastructure are dismissed as unsolvable structural problems. Thus, analyzing journalistic coverage is essential to understand how environmental risk discourses are constructed, reproduced, and frequently instrumentalized to perpetuate spatial and social inequalities in Santarém.

4. Final considerations

The data reveal three specific areas where disaster events and related news coverage are concentrated in Santarém. Mapping these data reveals a direct connection to the settlement of hydrographic systems, spanning from headwaters to alluvial plains. However, society's perception, as expressed through the analyzed news, is dominated by risks associated with heavy rainfall, with proposed solutions frequently limited to improving urban drainage. We emphasize the critical need to incorporate watersheds into risk mitigation and planning tools. This approach will enhance societal understanding of the unique dynamics governing different segments of urban streams.

The data found in news reports were vital for comprehensively understanding event impacts on individuals and the city. They illuminated both tangible and intangible dimensions absent from official documents, such as the risk zoning maps and civil defense incident reports foundational to this study. Moreover, these articles facilitate the recovery of the city's event history alongside characterizing details, such as precipitation volume and duration, which are useful for unraveling event-triggering factors.

By integrating the spatial mapping of incidents with journalistic coverage analysis, this study offers a novel approach to risk communication. It demonstrates how uneven news distribution is directly tied to journalistic routines and criteria (news values, gatekeeping, and agenda-setting), heavily influencing public perception of vulnerability and intervention priorities. This research demonstrates that media visibility in Santarém does not merely correspond to event frequency. Rather, it is shaped by location, visual impact potential, and ease of coverage access. By favoring specific areas, these factors reinforce socio-spatial inequalities and processes of environmental racism.

This contribution expands the communication debate by proposing that risk studies simultaneously incorporate spatial dimensions and journalistic framing. Such an approach identifies not only where and when events occur but also how they are narrated and socially perceived. This perspective is especially relevant for Amazonian contexts, where journalistic coverage faces logistical hurdles, unequal access to information, and an urgent need for communication strategies that bolster the resilience of highly vulnerable localities.

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