

Risk communication and urban resilience against floods: a comparative analysis between Santa Fe (Argentina) and Blumenau (Brazil)

Comunicación del riesgo y resiliencia urbana frente a inundaciones: análisis comparado entre Santa Fe (Argentina) y Blumenau (Brasil)

Comunicação de riscos e resiliência urbana contra inundações: análise comparativa entre Santa Fe (Argentina) e Blumenau (Brasil)

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Abstract: This article presents a comparative analysis of risk communication strategies in response to urban flooding, as implemented by local governments in Santa Fe (Argentina) and Blumenau (Brazil). The study adopts a qualitative, document-based approach to understand how public risk communication is configured in socially and environmentally vulnerable urban contexts, and how it contributes to building resilience. The analysis is structured around four core dimensions: the institutionalization of risk communication, educational initiatives and the promotion of a preventive culture, the operation of early warning systems, and the symbolic appropriation of disaster through collective memory. Findings reveal contrasting trajectories. Santa Fe developed a preventive communication strategy with strong educational and cultural foundations, integrated into local public policy. Blumenau, by contrast, prioritized a technocratic and reactive crisis communication model. The comparison shows that effective risk communication must go beyond issuing alerts during emergencies. Instead, it should be conceived as a sustained public policy that fosters civic engagement, social learning, and shared understandings of risk. These insights offer valuable contributions for rethinking urban risk communication strategies across Latin America.

Keywords: risk communication; urban floods; resilience; prevention culture; local policies.

Resumen: Este artículo presenta un análisis comparativo de las estrategias de comunicación del riesgo frente a inundaciones implementadas por los gobiernos locales de Santa Fe (Argentina) y Blumenau (Brasil), a partir de un enfoque cualitativo y basado en fuentes documentales. El estudio se propone comprender cómo se configura la comunicación pública del riesgo en contextos urbanos caracterizados por alta vulnerabilidad socioambiental, y de qué manera esta incide en los procesos de construcción de resiliencia. El análisis se estructura en torno a cuatro dimensiones clave: institucionalización de la comunicación del riesgo, acciones educativas y promoción de la cultura preventiva, funcionamiento de los sistemas de alerta, y apropiación simbólica del desastre a través de la memoria colectiva. Los resultados muestran trayectorias contrastantes. Santa Fe desarrolló una estrategia comunicacional preventiva, con fuerte anclaje educativo y cultural, integrada en las políticas públicas locales. En cambio, Blumenau priorizó una comunicación de emergencia centrada en la tecnificación y la gestión reactiva del riesgo. La comparación evidencia que una comunicación eficaz del riesgo no puede reducirse a la difusión de alertas en momentos críticos, sino que debe ser concebida como una política pública sostenida en el tiempo, capaz de articular participación ciudadana, aprendizaje social y significados compartidos sobre el riesgo. Estos hallazgos ofrecen aportes relevantes para repensar el papel de la comunicación en la gestión del riesgo urbano en América Latina.

Palabras clave: comunicación del riesgo; inundaciones urbanas; resiliencia; cultura preventiva; políticas locales.

Resumo: Este artigo apresenta uma análise comparativa das estratégias de comunicação de

riscos frente a inundações implementadas pelos governos locais de Santa Fe (Argentina) e Blumenau (Brasil), com base em uma abordagem qualitativa e fundamentada em fontes documentais. O estudo busca compreender como se configura a comunicação pública do risco em contextos urbanos marcados por alta vulnerabilidade socioambiental e de que forma essa comunicação contribui para os processos de construção da resiliência. A análise se organiza em quatro dimensões centrais: institucionalização da comunicação de risco, ações educativas e promoção da cultura preventiva, funcionamento dos sistemas de alerta e apropriação simbólica do desastre por meio da memória coletiva. Os resultados revelam trajetórias contrastantes. Santa Fe desenvolveu uma estratégia comunicacional preventiva, com forte enraizamento educativo e cultural, integrada às políticas públicas locais. Já Blumenau priorizou uma comunicação de emergência tecnicizada, com foco na gestão reativa do risco. A comparação evidencia que uma comunicação eficaz do risco não deve se restringir à emissão de alertas em momentos críticos, mas ser concebida como uma política pública contínua, capaz de articular participação cidadã, aprendizagem social e significados compartilhados sobre o risco. Esses achados oferecem subsídios relevantes para repensar o papel da comunicação na gestão do risco urbano na América Latina.

Palavras-chave: comunicação de risco; inundações urbanas; resiliência; cultura preventiva; políticas locais.

1. Introduction

Latin America faces structural challenges stemming from social inequality, uncontrolled urban expansion, and increasing exposure to socio-environmental disasters. In this scenario, floods constitute one of the most frequent and destructive threats, intensified by the effects of climate change (Office for the Coordination of Humanitarian Affairs [OCHA], 2020; Intergovernmental Panel on Climate Change [IPCC], 2022). Risk management in vulnerable urban contexts has become a strategic component of public policies, emphasizing preventive, territorial, and cross-cutting approaches (Narváez et al., 2009; Fontana & Conrero, 2017).

Risk communication has gained particular prominence as a tool that exceeds mere alert dissemination and must be understood as a social, educational, and symbolic process aimed at building resilience (Covello & Sandman, 2001; Renn, 2008). This perspective expands classical crisis communication approaches and proposes integrating citizen participation, production of shared meanings, and collective memory in disaster preparedness (Cozzi, 2019; Alende Castro, 2017).

This article aims to comparatively analyze risk communication strategies developed by two Latin American cities affected by severe flooding in recent decades: Santa Fe (Argentina) and Blumenau (Brazil). Both cases offer significant experiences, but with differentiated trajectories in institutional, operational, and cultural terms. The selection of these cases responds to their regional relevance, accessibility of documentary sources, and the possibility of observing systematic contrasts.

The choice of analytical dimensions – institutionalization, education and preventive culture, alert systems, and symbolic significance – directly addresses the research problem, allowing a comprehensive approach to how risk communication is configured in highly vulnerable urban contexts.

These dimensions allow observation not only of technical response capacity but also of the social, educational, and cultural conditions that influence the construction of urban resilience.

1.1. Study objectives

The general objective of this work is to understand how water risk communication is configured in two Latin American cities – Santa Fe and Blumenau – through their institutional policies, educational devices, alert systems, and symbolic practices.

The specific objectives guiding the study are:

Identify and contrast the institutional frameworks regulating risk communication in both cases.

Analyze educational and participatory actions aimed at building a preventive culture.

Evaluate the integration of alert mechanisms, collective memory, and symbolic appropriation of disaster in local risk communication strategies.

Each objective corresponds to a clearly defined analytical dimension. First, the notion of risk communication, understood as a broader process than mere alert emission, guides the analysis toward how local governments configure institutional frameworks, information devices, and dialogue strategies with citizens. This idea justifies the dimension referring to institutionalization, which examines the incorporation of communication as a stable and articulated public policy within risk management systems.

Second, approaches linking urban resilience with the formation of social and cultural capacities underpin the dimension of education and preventive culture. It is assumed that resilience building is not limited to works or technologies but also requires sustained educational processes, social appropriation of knowledge, and daily preventive practices.

The third dimension, relating to alert systems, derives from both technical literature on emergency management and communicational approaches emphasizing the importance of accessibility, clarity, and trust in issued messages. This dimension allows analysis of operational effectiveness and systems' capacity to activate informed and timely social responses. The concept of risk governance and discussions about collective memory as an element of social learning give rise to the dimension of symbolic significance of disaster.

Here it is considered that the ways societies remember, narrate, and resignify catastrophic events directly affect how they manage risk in the present and project more resilient future scenarios.

This articulation allows translating the conceptual framework into comparable operational criteria, ensuring a coherent empirical reading aligned with the study's objectives.

2. Methodology

This study follows a qualitative, comparative, and documentary approach, aimed at analyzing water risk communication strategies implemented by local governments in Santa Fe (Argentina) and Blumenau (Brazil). The selection of these cases is based on three criteria: the occurrence of recent catastrophic floods (2003 and 2007 in Santa Fe; 2008 in Blumenau), public availability of relevant documentary sources, and the possibility of contrasting two different institutional configurations facing a common challenge.

The analysis is structured from an exhaustive review of secondary sources, classified into five main categories:

Risk management and territorial planning documents, reflecting the strategic framework of public action.

Technical reports and institutional diagnoses, documenting implementation, monitoring, and evaluation processes of policies.

Regulations and local legislation, allowing identification of regulatory frameworks, competencies, and institutional responsibilities.

Communication materials and educational resources, evidencing awareness, training, and social appropriation strategies of risk.

Scientific literature and previous case studies, contextualizing and problematizing institutional responses.

The selection of these sources responded to three fundamental criteria: public accessibility, thematic relevance in relation to urban water risk management, and temporal validity, privileging documents produced in the last two decades, particularly from flood events that marked inflection points in both cities. Documents generated by government agencies, universities, technical agencies, and social organizations with recognized trajectory were prioritized.

The choice of these document types is justified by their capacity to reconstruct institutional and communicational trajectories, allowing observation of both formal strategies and symbolic expressions of risk management. Their integrated analysis offers a multidimensional and multifaceted view of the models adopted by each city.

Sources were processed through thematic content analysis, based on four analytical dimensions articulating theory, objectives, and empirical data:

Institutionalization of risk communication, oriented to the study of normative frameworks, organizational structures, and intergovernmental articulation.

Education and preventive culture, focused on training initiatives, awareness campaigns, and pedagogical strategies.

Alert systems, referring to technical and operational mechanisms for monitoring, anticipation, and response to hydrometeorological events.

Symbolic significance of disaster, considering collective memory actions, territorial appropriation, and cultural resignification of risk.

The selection of these dimensions is directly articulated with the study's specific objectives. The first – linked to institutional analysis – is addressed through the institutionalization dimension; the second – focused on educational and participatory processes – corresponds to the preventive culture dimension; and the third – referring to alert mechanisms and symbolic appropriation – unfolds in the dimensions of alert systems and disaster significance. This analytical structure ensures an integrated reading of cases from an approach coherent with the posed problem.

It should be noted that no interviews or fieldwork were conducted. This methodological decision, while implying a limitation regarding access to situated perceptions or informal dynamics, is compensated by a broad, contrastable, and updated documentary corpus. The adopted documentary approach allows developing a rigorous comparative analysis, based on systematized evidence, and represents an adequate methodological strategy for addressing communicational public policies in historical and institutional perspective.

3. Theoretical framework: risk communication, urban resilience, and institutional governance

In Latin America, floods constitute one of the main socio-environmental threats, exacerbated by climate change, uncontrolled urbanization, and structural inequalities. These threats cannot be understood only as natural events but as socially constructed phenomena (García Acosta, 2005; Padilla Lozoya, 2018; Lavell & Lavell, 2020; Le Breton, 2021). Within this framework, risk management has evolved toward approaches incorporating not only technical but also institutional, educational, and communicational dimensions (Narváez et al., 2009; Centro de Implementación de Políticas Públicas para la Equidad y el Crecimiento [CIPPEC], 2022).

Repeated environmental disasters, intensified by climate change impact, have led to rethinking communication forms in organizations. Communicative-discursive strategies regarding media use and communication forms have turned to understanding these types of events and communicating risk.

The capacity of public communication in risk and emergency environments is fundamental for modulating individual and social behavior, which in these cases is a central variable for mitigating and containing the often devastating effects these events cause.

Specific literature on the topic has allowed us to identify risk communication as an indispensable information transmission process for decision-making in crisis contexts. This idea is based on the claim that risk communication allows defining expectations, valuations, and perceptions,

affecting the social, political, and institutional capacity to prevent or modify dangerous situations facing populations (Rojas Orduña, 2003; Rosas Rodríguez & Barrios Puga, 2017).

Risk communication is applied in these situations as a set of capacities and knowledge to transmit adequate information to society about a potential or developing crisis, recognizing the logical uncertainty that facts generate and without attempting to completely eliminate fears (Estrada Paneque et al., 2013).

This type of communication has consolidated as a key dimension within this comprehensive approach. Far from being restricted to alert transmission, communication must be conceived as a process of social construction of risk meaning, articulating technical information, citizen participation, education, and collective memory (Covello & Sandman, 2001; Loose et al., 2023).

Recent studies highlight that communication effectiveness depends on its capacity to generate trust, adapt to sociocultural contexts, and foster sustained preventive practices over time (Renn, 2008; Alende Castro, 2017).

To this end, designing a communication strategy in risk contexts requires rigorous analysis to identify the population's level of knowledge about the threat in question. Likewise, it is fundamental to understand how people perceive risk, as well as the beliefs, cultural perceptions, and myths influencing their behavior. It is also relevant to consider the development vision held by community leaders and analyze how communication can contribute to strengthening local capacities for prevention, preparation, and response to risk situations (Salazar Vindas, 1999).

In sum, effective risk communication must include the following components: trust and credibility; early announcements; transparency; community involvement and planning ahead (Heredia Martínez & Artmann, 2021).

From an expanded perspective, communication is configured as a fundamental governance instrument, as it allows organizing social response to risk, facilitates collective learning processes, and contributes to legitimizing public policies (Palenchar, 2008). In this sense, its function goes beyond mere information transmission, positioning itself at the center of decision-making processes and institutional articulation. Additionally, it allows making visible symbolic dimensions of disaster – such as memory, mourning, or appropriation of affected space – that affect the construction of urban resilience.

Maurizi (2021) reinforces this conception by defining risk communication as a public policy in itself, highlighting its value as one of the most effective preventive strategies. From this perspective, communication acquires a cross-cutting character throughout the disaster risk management cycle, by fostering the construction of a prevention culture and strengthening links between State and society.

Based on this conviction, this work proposes conceiving risk commu-

nication as a constitutive dimension of public policy. It is not only about informing but generating spaces for active listening, negotiation, and social co-responsibility. This perspective requires rethinking institutional frameworks and communication devices from a participatory logic, in which involved actors are not mere receivers but co-constructors of the risk management process.

Urban resilience, for its part, refers to the capacity of social, institutional, and territorial systems to anticipate, absorb, adapt, and transform in the face of extreme events (Folke et al., 2010). In vulnerable urban contexts, this resilience is not limited to resistant infrastructure but requires flexible normative frameworks, collaborative governance, and participatory communication strategies (Lucatello & Garza Salinas, 2017; Chávez-Rodríguez, 2018). The incorporation of educational actions, territorial regulations, and memory devices strengthens not only preparation for future events but also social cohesion and institutional legitimacy.

Risk governance refers to the coordination capacity between government levels, technical agencies, and social actors to implement coherent, anticipatory, and sustained policies (Elander, 2002; CIPPEC, 2022). At the local level, this governance is expressed in normative frameworks, strategic plans, collaboration networks, and participation mechanisms that structure the response to hydrometeorological threats.

Ultimately, the concept of hydrographic basin as the basic territorial unit for water risk management is essential for understanding the analyzed cases. Floods cannot be addressed only as punctual events but as consequences of historical territorial processes linked to planning decisions, land use, and occupation of vulnerable areas (Aragón-Durand, 2014).

This planning proposal must consist of avoiding the exposure of goods and people to potential risk. Thus, land use zoning based on risk makes territorial planning a valuable instrument for mitigating and preventing urban floods. This strategy corresponds to the increase in adopting non-structural measures in managing hydrometeorological risks, promoting intervention models that combine hydraulic works with defense actions referring to the implementation of territorial policies and knowledge generation (Zapperi, 2018).

4. Results and discussion

Each of these three concepts guides the selection of analytical dimensions used in this study. The notion of risk governance supports the institutionalization dimension, as it allows observing how structures, regulatory frameworks, and intergovernmental dynamics are configured. The category of urban resilience justifies the analysis of educational and preventive practices as part of a socio-territorial adaptation strategy, expressed in the dimension of education and preventive culture. Finally, the risk communication ap-

proach – conceived as a pedagogical, symbolic, and participatory process – informs both the study of alert systems and actions oriented toward disaster significance, including collective memory and territorial appropriation. This articulation ensures that empirical analysis maintains coherence with conceptual frameworks and responds directly to the research problem.

The following section analyzes the institutional reconfiguration that each local government acquires to face water risk.

4.1. Institutionalization of risk communication

As shown in Table 1, both cities reconfigured their institutionality after suffered water catastrophes, although they did so from different approaches and scales. In Santa Fe, the institutionalization of risk communication was part of a comprehensive municipal strategy articulated with the academic sphere. Starting in 2008, a Risk Communication Program was created within the local government, with participation from the National University of Litoral (UNL), oriented toward citizen awareness, construction of social memory, and incorporation of the communicational dimension in urban planning (Viand, 2014; Majo, 2022).

In contrast, Blumenau developed a more reactive and technical approach, with strong state support. The Municipal Civil Defense Secretariat, in articulation with the Santa Catarina State Civil Defense, assumed coordination, response, and operational communication functions, particularly visible during “Operation Hope” in 2008 (Chicatto & Bohn, 2015). While there was articulation with universities such as FURB and CEOPS, a sustained communicational policy was not consolidated beyond the emergency context (Reis et al., 2013; Loose et al., 2023).

From a governance perspective, Santa Fe presents a more horizontal model, based on local knowledge production and territorial decentralization, while Blumenau is inserted in a hierarchical vertical scheme, with

Table 1 Institutionalization of risk communication

Aspect	Santa Fe (Argentina)	Blumenau (Brazil)
Level of institutional articulation	Local predominance with academic alliances (UNL)	Multi-scalar coordination (municipality–state–university)
Risk management structure	Municipal Risk Management System; Risk Management Directorate	Municipal Civil Defense Secretariat; articulation with state SDC
Formal communication program	Risk Communication Program (2008) with institutional continuity	Centralized communication during “Operation Hope” (2008)
University participation	High: technical cooperation with UNL	High: technical cooperation with FURB, CEOPS, EPAGRI
Citizen participation	Moderate: municipal districts, workshops, social memory	High in emergencies: Itajaí Basin Committee, solidarity radio network
Governance model	Horizontal, territorial, based on local knowledge	Vertical, technocratic, oriented to operational response

SOURCE: Author’s elaboration based on documentary sources and secondary bibliography.

less municipal prominence in formulating communicational content. This difference impacts the social legitimacy of messages, community appropriation of risk, and continuity of preventive actions (Arias & Doldán, 2021; Rosito Listo, 2023).

In summary, Santa Fe shows a higher degree of institutionalization of risk communication as public policy with pedagogical and territorial perspective. Blumenau, in contrast, reinforces technical and operational capacities but lacks continuity in its communicational policy outside the crisis framework. This difference reveals the tension between models based on anticipation and social learning versus those centered on immediate response (Fontana & Conrero, 2017).

The following section analyzes how each city integrated education, participation, and construction of preventive culture as part of its risk communication strategy, including the comparative matrix based on verifiable documentary sources.

4.2. Education and preventive culture

Education and preventive culture are key pillars for promoting resilient communities, by allowing the population to understand the risks they are exposed to and actively participate in their reduction (Loose et al., 2023; Arias & Doldán, 2021). In this sense, Santa Fe developed a more sustained and institutionalized approach than Blumenau, with actions integrated into the formal educational system and community sphere.

After the 2003 and 2007 floods, Santa Fe implemented the Classroom-City Program, an environmental education initiative oriented toward risk prevention, in collaboration with UNL and other entities. This program produced specific materials such as the booklets “The City and the River” and “Living with the River”, designed for inclusion in schools (Mosso, 2019). Additionally, guided visits to pumping stations and territorial awareness activities were promoted, with emphasis on disaster memory as a pedagogical tool (Mizooocky & López, 2018).

Blumenau also developed educational initiatives, such as the Civil Defense at School program, aimed at students in risk areas. While this program included workshops, drills, and didactic materials, its continuity and depth were limited, and its implementation was mainly concentrated in the period following the 2008 disaster (Chicatto & Bohn, 2015). No institutionalized processes of curricular integration or sustained actions of symbolic risk resignification were recorded.

As shown in Table 2, from the perspective of participatory communication, Santa Fe opted for a decentralized educational model based on social learning, while Blumenau focused on technical training with less structural community involvement. This difference influences citizen appropriation of risk and internalization of preventive practices (Rosboch, 2019).

Comparative evidence suggests that Santa Fe advanced more in devel-

Table 2 Education and preventive culture

Aspect	Santa Fe (Argentina)	Blumenau (Brazil)
Formal educational program	Classroom-City, school booklets, school activities	Civil Defense at School, focused school workshops
Curricular integration	High: articulation with school content and teacher participation	Low: no long-term curricular institutionalization
Pedagogical materials	Printed booklets, videos, online resources with territorial focus	Basic manuals and simulations led by Civil Defense
Community participation	Moderate to high: commemorations, neighborhood workshops, guided visits	Low outside emergency context
Approach	Educational, participatory, cultural	Technical, focused, instrumental
Continuity	Sustained over time	Discontinuous and concentrated in post-disaster stage

SOURCE: Author's elaboration from institutional sources and specialized bibliography.

oping a sustained preventive culture, with inter-institutional articulation and community appropriation. In contrast, Blumenau structured punctual interventions, useful for crisis management but without institutional continuity. This difference reinforces the idea that resilience requires not only effective technical systems but also educational processes rooted in the social fabric (Chávez-Rodríguez, 2018; Gardiol & Valle Morresi, 2023).

The next section analyzes the infrastructure, effectiveness, and sustainability of alert mechanisms in both cities, always from a communicational perspective.

4.3. Alert systems

Early warning systems constitute a critical component of disaster risk management, allowing anticipation of extreme events, activation of response protocols, and reduction of population exposure. Their effectiveness depends not only on the technological devices employed but on their articulation with clear, accessible, and culturally appropriate communication strategies (Palenchar, 2010; Lugones Muro y Badia Valdéz, 2019).

As expressed in Table 3, in Blumenau, after the 2008 event, the ALERTABLU system was consolidated, integrating meteorological monitoring, visualization of hydrological stations, and automated alert emission through SMS, social networks, and web platforms. This system is operated by the Municipal Civil Defense Secretariat in articulation with CEOPS and EPAGRI/CIRAM, and stands out for its technical capacity and continuous updating (Chicatto & Bohn, 2015; Herrera, 2015).

Santa Fe, for its part, does not have an automated system of similar characteristics but has developed participatory communication protocols for critical events. Alerts are disseminated through local media, community networks, and institutional channels, and are supported by a strong preven-

Table 3 Alert Systems

Aspect	Santa Fe (Argentina)	Blumenau (Brazil)
System type	Municipal alert protocol; dissemination through local media	ALERTABLU system (automated, multichannel, high coverage)
Technical operability	Moderate: requires human action for activation and dissemination	High: permanent monitoring with sensors and automatic thresholds
Communication channels	Local media, community networks, participatory dissemination	SMS, ALERTABLU APP, social networks, web portal
Citizen participation	High in community interpretation and activation	Low: unidirectional information, no structured feedback
Message accessibility	High: adapted language, use of neighborhood references	Variable: predominance of technical-institutional format
Link with education	High: educational strategies integrated into alerts	Low: scarce connection with school or pedagogical content

SOURCE: Author's elaboration from official documents and academic literature.

tive education strategy, which facilitates interpretation and appropriation of messages by the population (Viand, 2014; Mosso, 2019).

From a communicational governance perspective, Blumenau's system represents a technocratic model of high operational precision but with less social interaction, while the Santa Fe model, although more technically limited, promotes processes of community appropriation of risk knowledge.

In summary, while Blumenau has managed to consolidate a robust alert system from a technical standpoint, Santa Fe presents a strategy more linked to community communication and social risk education. The comparison reinforces the notion that the most effective alert systems are those that combine technology, communicative accessibility, and social appropriation (Renn, 2008; Lugones Muro y Badia Valdéz, 2019).

The immediate section explores how cities managed collective memory, public narratives, and symbolic appropriations linked to risk, thus completing the comparative analysis of risk communication.

4.4. Symbolic significance of disaster

In Table 4, it can be considered how the symbolic significance of disasters constitutes a fundamental dimension of risk communication, as it affects the way traumatic events are interpreted, remembered, and collectively processed. The social construction of risk not only implies anticipating threats but also elaborating shared memories that allow resignifying the territory and strengthening community identity (Padilla Lozoya, 2018; Arias & Doldán, 2021).

In Santa Fe, this dimension has been extensively worked from local management. The creation of the Flood Memorial, commemorative acts on April 29, and the incorporation of disaster in educational materials are part of an institutionalized memory strategy aimed at keeping risk awareness alive. These actions not only fulfill a pedagogical role but reinforce

Table 4 Symbolic significance of disaster

Aspect	Santa Fe (Argentina)	Blumenau (Brazil)
Memory devices	Urban memorial, commemorative acts, school materials	No sustained institutional devices
Integration in local policy	High: official commemoration and symbolic continuity	Low: limited to emergency context
Narrative approach	Historical, emotional, and pedagogical reconstruction	Technical, functional description centered on operational response
Community symbolic participation	Medium-high: workshops, school narratives, space appropriation	Low: limited to spontaneous narratives and media coverage during crisis
Temporal continuity	Sustained since 2003	Discontinuous, without institutionalization after 2008 event

SOURCE: Author's elaboration from official documentation, local press, and specialized bibliography.

the legitimacy of public policies by recognizing collective suffering and promoting social learning (Mizocky & López, 2018; Mosso, 2019).

In Blumenau, while spontaneous expressions of community memory were recorded – such as oral narratives or solidarity media coverage during Operation Hope – no sustained institutional devices were consolidated over time to work on disaster significance. Communication remained centered on emergency, with emphasis on technical data and security protocols, without advancing toward a public narrative that promotes historical reflection or cultural appropriation of the event Reis et al., 2013; Loose et al., 2023).

From a communicational perspective, this difference is relevant. While Santa Fe resignifies risk as part of the urban narrative, incorporating emotions, memory, and symbolic participation; Blumenau, in contrast, maintains a functionalist approach that does not articulate the event with medium or long-term cultural processes.

This last dimension highlights that risk communication is not only technical but also symbolic, affective, and political. Recognizing the role of memory and cultural appropriation of disaster is key to transforming traumatic events into collective learning that feeds long-term resilience policies (Baez Ullberg, 2017; Chávez-Rodríguez, 2018).

The comparison between the cases of Santa Fe (Argentina) and Blumenau (Brazil) allows visualizing tensions between risk governance models centered on technical expertise and those promoting active citizen participation. In Santa Fe, risk communication is configured as a cross-cutting public policy, not limited to mere data transmission but articulated through participatory social cartography and educational programs that reconfigure the link between State and citizenship. Blumenau, for its part, maintains a robust institutional architecture based on civil defense, early warning system, and hydrometeorological monitoring, but its structure offers few mechanisms to incorporate local knowledge and social practices of territories. This comparison does not seek to establish a hierarchy between

models but to highlight that effectiveness in risk management is enhanced when technical knowledge is articulated with social memory, and when information circulates bidirectionally between authorities and communities.

5. Final considerations

The comparative analysis between Santa Fe (Argentina) and Blumenau (Brazil) allows identifying two distinct but complementary trajectories in configuring local risk communication strategies against floods. Through the analyzed dimensions – institutionalization, education and preventive culture, alert systems, and symbolic significance – both strengths and limitations of each experience stand out.

Santa Fe opted for a comprehensive, preventive, and sustained communicational model, articulating its own institutional frameworks, pedagogical devices, memory construction, and territorial appropriation of risk. The alliance with the academic sphere and the incorporation of communication as cross-cutting public policy allowed it to develop a preventive culture with greater social anchoring. In this model, communication is conceived not only as a management tool but as a pedagogical and symbolic process serving urban resilience.

Blumenau, in contrast, prioritized a technocratic and operational approach, centered on the effectiveness of institutional response and strengthening of monitoring and alert systems. While it developed highly functional tools, such as the ALERTABLU system, and articulated state and technical capacities, its communicational model remained more linked to emergency situations, with less educational or symbolic continuity outside the crisis context.

Both models offer relevant learning. The Santa Fe experience shows the potential of preventive communication as part of a participatory governance process. Blumenau, for its part, evidences the importance of having solid technological systems and institutional response capacity. An ideal model, therefore, would combine the strengths of both: advanced technical infrastructure with a pedagogical, cultural, and sustained communicational strategy.

From a methodological point of view, this study allowed observing that risk communication can be analyzed from multiple levels: institutional, educational, operational, and symbolic. Despite not being based on fieldwork, the documentary strategy employed allowed building a solid, systematic, and verifiable comparison. However, it is recognized that the analysis may be conditioned by the unequal availability of public and academic sources, which in the case of Santa Fe was broader and more consolidated than in Blumenau. This difference may have influenced the depth level achieved in each case, constituting an inherent limitation of the adopted approach.

Finally, the study reinforces the idea that risk communication should

not be limited to alerting but to transforming: the relationship between citizenship and institutions, between technical knowledge and community wisdom, between collective memory and urban planning. In this direction, future research may delve into the social impacts of these strategies, citizen perception of risk, and the role of local media in building urban resilience.

References

- Alende Castro, S. (2017). Comunicar el riesgo desde la anticipación: El periodismo de prevención, una propuesta. *Anuario Electrónico de Estudios en Comunicación Social – Disertaciones*, 10(2), 20–38. <https://doi.org/10.12804/revistas.urosario.edu.co/disertaciones/a.4539>
- Aragón-Durand, F. (2014). *Inundaciones en zonas urbanas de cuencas en América Latina*. Soluciones Prácticas. <https://latam.practicalaction.org/publicaciones/inundaciones-en-zonas-urbanas-de-cuencas-en-america-latina/>
- Arias, G., & Doldán, L. (2021). *Comunicar lo local: Estrategias electorales y de gobierno*. La Crujía.
- Baez Ullberg, S. (2017). Desastre y memoria material: La inundación 2003 de Santa Fe, Argentina. *Iberoamericana – Nordic Journal of Latin American and Caribbean Studies*, 46(1), 42–53. <https://doi.org/10.16993/iberoamericana.106>
- Chicatto, J., & Bohn, N. (2015). Disaster risk management and non-structural civil defense actions in the municipality of Blumenau/SC. *Pesquisa em Educação Ambiental*, 10, 124–143. <https://doi.org/10.18675/2177-580X.vol10.n2.p124-143>
- Chávez-Rodríguez, L. (2018). Vulnerabilidad social y riesgo de desastre por inundación. In I. R. Carriquiribonde (Ed.), *Sociología del riesgo: Marcos y aplicaciones*. Universidad Nacional Autónoma de México. <https://www.researchgate.net/publication/326274323>
- Centro de Implementación de Políticas Públicas para la Equidad y el Crecimiento. (2022). *La gestión local del riesgo: Bases y herramientas para la construcción de ciudades más resilientes*. CIPPEC. <https://www.cippec.org/publicacion/la-gestion-local-del-riesgo-bases-y-herramientas-para-la-construccion-de-ciudades-mas-resilientes/>
- Covello, V., & Sandman, P. (2001). Comunicación de riesgos: Evolución y revolución. In A. Wolbarst (Ed.), *Soluciones a un medio ambiente en peligro* (pp. 164–178). Johns Hopkins University Press.
- Cozzi, J. M. (2019). *La ubicuidad del riesgo: Gestión de la comunicación en contextos de catástrofes*. Espacio Editorial Institucional UCU.
- Elander, I. (2002). Las alianzas y la gobernanza urbana. *Revista Internacional de Ciencias Sociales*, 54(2), 191–204. https://unesdoc.unesco.org/ark:/48223/pf0000126912_spa
- Estrada Paneque, M. U., Espinosa Guerra, A. I., & Vinajera Torres, C. R. (2013). Amenazas, desastres y comunicación/prevenición del riesgo: Trinomio que requiere de un cambio de mentalidad hacia la niñez. *Multimed*, 17(1), 1–17. <https://www.medigraphic.com/pdfs/multimed/mul-2013/mul131m.pdf>
- Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience thinking: Integrating resilience, adaptability and transformability. *Ecology and Society*, 15(4), Article 20. <https://www.ecologyandsociety.org/vol15/iss4/art20/>
- Fontana, S., & Conrero, S. (2017). Estrategias de gobierno para gestionar el riesgo de desastres: Planificación, diseño organizacional y comunicación. *Estado Abierto: Revista sobre el Estado, la Administración y las Políticas Públicas*, 1(2), 183–202. <https://publicaciones.inap.gob.ar/index.php/EA/article/view/38>

- García Acosta, V. (2005). El riesgo como construcción social y la construcción social de riesgos. *Desacatos*, 19, 11–24. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1607-050X2005000300002
- Gardiol, M., & Valle Morresi, M. del. (2023). Medidas estructurales y no estructurales implementadas en el albardón costero de Santa Fe. *REDER – Revista de Estudios Latinoamericanos sobre Reducción del Riesgo de Desastres*, 7(1), 61–76. <https://doi.org/10.55467/reder.v7i1.108>
- Heredia Martínez, H. L., & Artmann, E. (2021). Análisis de contenido utilizando webQDA en el estudio de la comunicación de riesgos durante el COVID-19: El caso de Nueva Zelanda. *New Trends in Qualitative Research*, 8, 383–391. <https://doi.org/10.36367/ntqr.8.2021.383-391>
- Herrera, I. (2015). *Diez lecciones para la gestión del riesgo de inundaciones en Latinoamérica*. Apuntes de InvestigAcción. <https://bvpad.indec.gov.pe/doc/pdf/esp/doc2583/doc2583-contenido.pdf>
- Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation and vulnerability*. IPCC. <https://www.ipcc.ch/report/ar6/wg2/>
- Lavell, A., & Lavell, C. (2020). *El COVID-19: Relaciones con el riesgo de desastres, su concepto y gestión*. https://www.desenredando.org/public/2020/Lavell_2020-07_Covid-19_y_Desastre_Final.pdf
- Le Breton, D. (2021). *Sociología del riesgo*. Prometeo.
- Loose, E. B., Londe, L. R., & Marchezini, V. (2023). Comunicación de los organismos de protección civil en Brasil: ¿Énfasis en riesgos o desastres? *REDER – Revista de Estudios Latinoamericanos sobre Reducción del Riesgo de Desastres*, 7(1), 165–173. <https://doi.org/10.55467/reder.v7i1.114>
- Lucatello, S., & Garza Salinas, M. (2017). *Cambio climático y desastres: Un enfoque en políticas públicas*. UNAM. <https://www.pincc.unam.mx/publicaciones/cambio-climatico-y-desastres-un-enfoque-en-politicas-publicas/>
- Lugones Muro, M., & Badia Valdés, A. T. (2019). La comunicación para el fortalecimiento de los sistemas de alerta temprana. *Alcance*, 8(21), 24–29. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2411-99702019000300024
- Majo, V. de. (2022). Institutional conditions for building proactive flood management: Lessons from Santa Fe in Argentina. *International Journal of Disaster Risk Reduction*, 81, 103251. <https://doi.org/10.1016/j.ijdr.2022.103251>
- Maurizi, V. (2021). Comunicar el riesgo de desastres: Una mirada desde la comunicación política y la gestión del riesgo de desastres al caso de las inundaciones de la ciudad de Santa Fe. *Studia Politicae*, 53, 39–54. <https://doi.org/10.22529/sp.2021.53.03>
- Mizooocky, A., & López, M. (2018). Mecanismos para abordar la resiliencia urbana desde la escala local. *Revista de Res Architettura*, 3. <https://revistas.unc.edu.ar/index.php/drarchitettura/article/view/22838>
- Mosso, E. (2019). La resiliencia a la carta: Relocalización de familias tras la recualificación urbana del oeste de Santa Fe. In *Seminario Internacional de Investigación en Urbanismo (SIU)*. <https://doi.org/10.5821/SIU.6699>
- Narváez, L., Lavell, A., & Pérez Ortega, G. (2009). *La gestión del riesgo de desastre: Un enfoque basado en procesos*. PREDECAN. <https://repositorio.gestiondelriesgo.gov.co:8443/handle/20.500.11762/19759>
- Office for the Coordination of Humanitarian Affairs. (2020). *Desastres naturales en América Latina y el Caribe 2000–2019*. Naciones Unidas. <https://reliefweb.int/report/world/>

- Padilla Lozoya, R. (2018). Construcción periodística del sismo o ¿desastre? *Revista Mexicana de Sociología*, 80, 41–69. https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0188-25032018000500041
- Palenchar, M. J. (2010). Risk communication. In R. L. Heath (Ed.), *The SAGE handbook of public relations* (pp. 447–460). SAGE Publications.
- Reis, C., Zucco, F. D., & Darolt, E. (2013). La comunicación del ayuntamiento de Blumenau (Brasil) durante el desastre natural de noviembre de 2008. *Anuario Electrónico de Estudios en Comunicación Social – Disertaciones*, 6(1), 86–105. <https://revistas.urosario.edu.co/index.php/disertaciones/article/view/3862>
- Renn, O. (2008). *Risk governance: Coping with uncertainty in a complex world*. Earthscan. <https://doi.org/10.4324/9781849772440>
- Rojas-Orduña, O. I. (2003). Communication in crisis times. *Comunicar*, 21, 137–140. <https://doi.org/10.3916/C21-2003-21>
- Rosas Rodríguez, M. E., & Barrios Puga, A. (2017). Comunicación de riesgo, cambio climático y crisis ambientales. *Chasqui – Revista Latinoamericana de Comunicación*, 136, 179–194. <https://doi.org/10.16921/chasqui.v0i136.3294>
- Rosboch, M. E. (2019). Comunicar en momentos de crisis: Emergencia de lazos sociales. *Temas y Problemas de Comunicación*, 17. <https://www2.hum.unrc.edu.ar/ojs/index.php/TyPC/article/view/1011>
- Rosito Listo, F. de L. (2023). La perspectiva de las comunidades en el mapeo de áreas de riesgo de inundación. *Punto Sur*, 9, 241–266. <https://doi.org/10.34096/ps.n9.12631>
- Salazar Vindas, S. (1999). *Guía para la comunicación social y la prevención de desastres: La prevención de desastres comienza con la información*. DIRDN. <http://cidbimena.bvs.hn/docum/ops/publicaciones/ops02/ops02.7.htm>
- Viand, J. (2014). El desafío del ordenamiento urbano con enfoque en reducción de riesgos de desastres: El caso de Santa Fe. In *XI Simposio de la Asociación Internacional de Planificación Urbana y Ambiente*. <http://sedici.unlp.edu.ar/>
- Zapperi, P. A. (2018). Análisis de la incorporación del riesgo de inundación en la normativa de ordenamiento territorial de Argentina. *Investigaciones Geográficas*, 70, 71–90. <https://doi.org/10.14198/INGEO2018.70.04>