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Systematic review on state resilience and systemic gaps in disaster risk management

Revisión sistemática sobre resiliencia estatal y brechas sistémicas en gestión del riesgo de desastres

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Abstract

This study examines the resilience of the Peruvian state in disaster risk management within the Latin American context, one of the regions most vulnerable to climate change due to its geographical characteristics. Although advanced regulatory frameworks exist, a considerable gap persists between institutional design and effective implementation. The research was conducted through a systematic literature review following the PRISMA methodology, which analyzed 44 studies published between 2015 and 2024. The results show that the deficit in state resilience is systemic and is articulated in five interrelated dimensions: fragmented and centralized governance; deficient territorial planning; limited technical capacities; low community participation; and persistent structural vulnerabilities. Furthermore, a critical gap is identified between available knowledge and its practical application, which negatively impacts the incorporation of that knowledge into public policies. The study concludes that strengthening state resilience requires moving beyond the prevailing reactive approach and advancing toward proactive, decentralized, transparent, and inclusive risk governance. This analysis offers an integrated synthesis of key factors and underscores the need to incorporate risk management into development planning, addressing the structural causes of vulnerability and presenting relevant implications for Latin America.

Keywords: state resilience, disaster risk management, risk governance.

Resumen

El presente estudio examina la resiliencia del Estado peruano en la gestión del riesgo de desastres dentro del contexto latinoamericano, una de las regiones más vulnerables al cambio climático por sus características geográficas. Aunque existen marcos normativos avanzados, persiste una brecha considerable entre el diseño institucional y su implementación efectiva. La investigación se desarrolló mediante una revisión sistemática de la literatura siguiendo la metodología PRISMA, que analizó 44 estudios publicados entre 2015 y 2024. Los resultados muestran que el déficit de resiliencia estatal es sistémico y se articula en cinco dimensiones interrelacionadas: gobernanza fragmentada y centralizada; planificación territorial deficiente; capacidades técnicas limitadas; baja

participación comunitaria; y persistencia de vulnerabilidades estructurales. Además, se identifica una brecha crítica entre el conocimiento disponible y su aplicación práctica, lo que afecta negativamente la incorporación de ese conocimiento en las políticas públicas. Se concluye que fortalecer la resiliencia estatal requiere superar el enfoque reactivo predominante y avanzar hacia una gobernanza del riesgo proactiva, descentralizada, transparente e inclusiva. Este análisis ofrece una síntesis integrada de factores clave y subraya la necesidad de incorporar la gestión del riesgo en la planificación del desarrollo, abordando las causas estructurales de la vulnerabilidad y presentando implicaciones relevantes para América Latina.

Palabras Clave: resiliencia estatal, gestión del riesgo de desastres, gobernanza del riesgo.

Introduction

Latin America and the Caribbean rank among the world's most vulnerable regions to seismic and environmental hazards, the frequency and intensity of which have increased considerably as a result of climate change. Empirical evidence points to significant rises in droughts (147 %), storms (192 %), and floods (124 %), which together caused over 400,000 deaths and economic losses exceeding USD 183 billion between 1980 and 2016 (Guerrero & Lacambra, 2020). Disaster risk management (DRM) is thus a matter of considerable social relevance and occupies a strategic position on the regional public agenda. Nevertheless, despite a well-established normative framework, a substantial gap persists between institutional design and effective implementation, significantly constraining risk reduction across diverse contexts (Pereira & Raju, 2020).

Various studies contend that disasters should not be viewed solely as natural phenomena but rather as outcomes of social processes of risk construction, shaped by political, economic, and territorial factors that generate context-specific vulnerability profiles. In Latin America, development patterns marked by structural inequality, informal urbanization and infrastructure, and weak territorial governance contribute to the systematic reproduction of risk and restrict the state's capacity to prevent and mitigate its impacts (Pereira & Raju, 2020).

Within this framework, resilience has become a central component of DRM. Beyond mere recovery from adverse events, resilience entails the capacity of systems to adapt and transform in the face of persistent risk conditions. At the state level, resilience is reflected in the ability of institutions to anticipate, absorb, and respond effectively to disasters, minimizing impacts and preventing the exacerbation of structural vulnerabilities.

In Peru, disaster risk management is challenged by high exposure to socio-natural events due to the country's territorial and climatic diversity, its complex geodynamics, and processes of informal land occupation (Espinoza et al., 2022).

Events associated with the El Niño–Southern Oscillation have caused recurrent impacts in Peru, exposing structural limitations in institutional response capacities. A notable case is the 2017 Coastal El Niño, which affected more than 1.7 million people and generated losses exceeding USD 3.1 billion (French et al., 2020).

Despite progress, evidence indicates that the problem lies not solely in the magnitude of hazards but in the state's capacity to manage them effectively. Key factors such as institutional fragmentation, centralized decision-making, and systemic corruption weaken the implementation of public policies, creating a critical gap between the normative and operational levels (French et al., 2020).

In this context, a research gap emerges regarding the comprehensive understanding of state resilience in disaster risk management, particularly in the Peruvian case and its relationship with the structural dynamics, characteristic of Latin America. This gap limits the development of integrated approaches to governance, institutional capacities, and socioeconomic factors in risk analysis.

Accordingly, the following research question was posed: How do systemic gaps affect state resilience in disaster risk management? The study's objective was therefore to analyze state resilience and systemic gaps in DRM through a systematic review of the scientific literature. In doing so, the study seeks to identify the main factors that contribute to reducing existing structural gaps and the lessons learned that can strengthen risk governance in Latin America.

Methodology

This study was conducted as a systematic literature review aimed at analyzing the critical factors conditioning state resilience in disaster risk management. The research followed the PRISMA 2020 guidelines and

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its PRISMA-S extension, which ensure transparency, reproducibility, and comprehensiveness in systematic reviews (Page et al., 2021; Rethlefsen et al., 2021).

A structured search was implemented across high-impact indexed scientific databases, including Scopus, Web of Science, PubMed, ScienceDirect, EBSCO, and SciELO. The search strategy was designed to identify studies published between 2015 and 2024, in order to capture the most recent and relevant evidence on state resilience and disaster risk management.

Search equations combined controlled descriptors (MeSH) and keywords using Boolean operators (*AND, OR, NOT*), adapted to the particularities of each database to maximize the retrieval of pertinent literature.

The distribution of the bibliographic search strategies is shown in Table 1. Initial results revealed adequate diversification of the literature, with Scopus and Web of Science emerging as the primary sources of scientific production.

Table 1
Bibliographic search strategy

Database	Search terms	Initial results
Scopus	("disaster resilience" OR "state resilience") AND ("governance" OR "risk management") AND Peru	145
Web of Science	TS=("resilience" AND "disaster management") AND ("Latin America" OR Peru)	132
Scielo/EBSCO	("gestión de riesgos" AND "resiliencia estatal") AND ("América Latina")	73

Note. Authors' own elaboration

In addition, inclusion and exclusion criteria were defined during the selection process to ensure methodological quality and thematic relevance of the reviewed studies. Priority was given to original peer-reviewed scientific articles published in English or Spanish that addressed topics related to state resilience and disaster risk management from a governance perspective.

Documents lacking academic rigor were excluded, including editorials, letters, conference abstracts, non-peer-reviewed studies, and those not aligned with the state or institutional focus of the analysis. The systematization of these criteria is presented in Table 2, which demonstrates the rigor of the selection process applied.

Table 2
Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Document type	Original scientific articles	Editorials, letters, conference abstracts
Time period	2015–2024	Prior to 2015
Language	English or Spanish	Other languages
Peer review	Yes	Not peer-reviewed
Thematic relevance	State resilience and DRM	Topics unrelated to the state focus

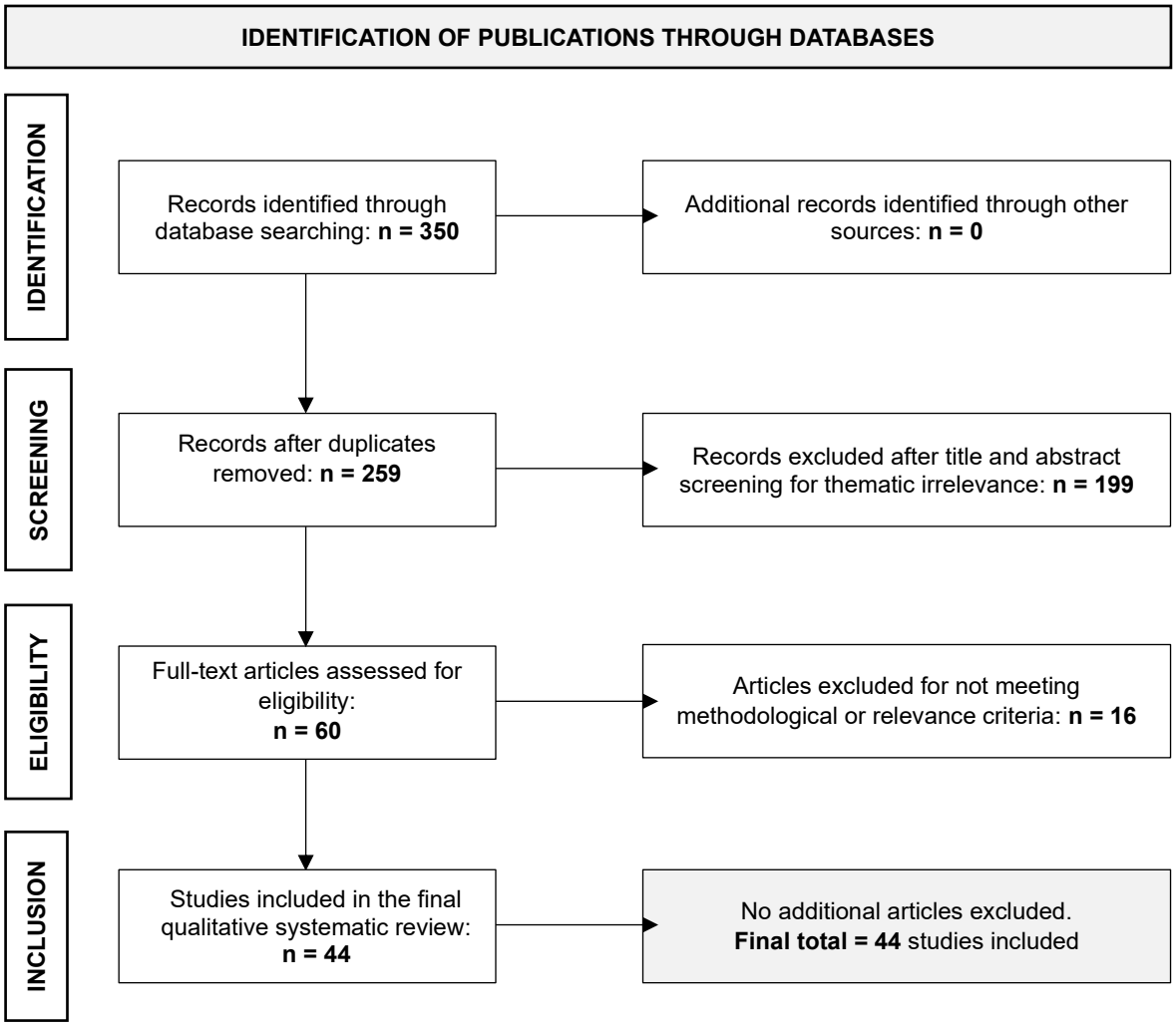
Note. Authors' own elaboration

Citation records and references were managed using Mendeley and Rayyan, allowing for duplicate removal and traceability in accordance with PRISMA-S (Rethlefsen et al., 2021). Selection involved title/abstract screening and full-text evaluation by independent reviewers; discrepancies were resolved by consensus or with the assistance of a third evaluator, following PRISMA recommendations (Page et al., 2021).

Through this process, 350 records were identified from databases with no additional sources. Duplicate records were removed using the reference managers, yielding 259 documents. After a thorough title and abstract review, 199 records were excluded due to lack of relevance. The remaining 60 were assessed against the evaluation criteria, with 16 excluded for methodological limitations or limited relevance. Ultimately, 44 studies were included in the qualitative review. No bias tests were applied during the evaluation process; however, rigor and diversity of the consulted sources were ensured. The methodology of the process is detailed in Figure 1.

Figure 1

Flow diagram summarizing the search and review process



Note. Authors' own elaboration (2026)

Finally, methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT, 2018), which enabled systematic analysis of qualitative, quantitative, and mixed-method approaches in an integrated manner. Two reviewers independently assessed five quality criteria. Although studies were not excluded on this basis, the evaluation informed the interpretation of results to support critical reading. Certainty of evidence was assessed by considering consistency, methodological quality, precision, and applicability to the Latin American context. Studies focused exclusively on individual resilience or lacking a risk governance perspective were excluded. Although the

review was not registered in PROSPERO, the PRISMA 2020 protocol was followed, thereby ensuring methodological rigor.

Results

Following the PRISMA protocol, 44 rigorous studies meeting the established inclusion criteria were incorporated, forming the basis for the qualitative analysis of state resilience in disaster risk management. The results were organized into three levels: characterization of the evidence, analytical systematization, and synthesis of essential critical factors.

Table 3 (Characterization of the evidence) summarizes the relevant findings. The table details the distribution of studies by geographic scope, type of disaster, and unit of analysis, and includes analysis of the Peruvian context alongside comparative and global studies.

Table 3

Characterization of the evidence

Representative references	Geographic scope	Type of risk/disaster	Unit of analysis
French et al. (2020)	Peru	Coastal El Niño	Institutional actors and affected communities
Moya et al. (2024)	Metropolitan Lima	Urban vulnerability (earthquakes, landslides)	Informal urban expansion areas
Lavell et al. (2023)	Lima	Multi-hazard (earthquakes, mudslides, COVID-19)	Urban settlements and metropolitan data
Flores et al. (2025)	Tumbes	Post-El Niño psychosocial impact	Local population and authorities
Lerner & Van Praag (2024)	Chosica	Landslides (huaycos)	Community leaders
Obando Zegarra et al. (2023)	Lima	Critical infrastructure risk	Public hospitals
Greiving et al. (2021)	Metropolitan Lima	Multi-risk	Critical infrastructure
Roland et al. (2023)	Peru	Social vulnerability	Districts nationwide
Torres-Mercado et al. (2025)	Mantaro Basin	Floods	River basins
Emmer et al. (2025)	Peruvian Andes	GLOF	Specific glacial event
Zhu et al. (2025)	China (comparative)	Urban floods	Urban areas
Karnoto et al. (2025)	Indonesia	Tsunamis/earthquakes	Indigenous communities
Reid et al. (2009)	Global	Multi-climatic risk	Vulnerable communities

Note. The table shows the diversity of contexts, risk types, and units of analysis addressed in the reviewed literature. Authors' own elaboration

The reviewed literature reveals a notable predominance of research on El Niño, floods, and landslides, alongside significant multi-hazard risk studies, underscoring the substantial importance of these hazards (French et al., 2020; Moya et al., 2024). A noteworthy methodological combination of quantitative and qualitative approaches was also observed, with procedures such as geospatial modeling and analysis, case studies, and interviews standing out, enabling a comprehensive understanding of the risk phenomenon.

Regarding the various units of analysis, the studies encompass scales ranging from local contexts, such as communities and informal human settlements, to national and comparative levels, clearly evidencing the multi-

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scalar nature of risk. This methodological and contextual diversity constitutes a key point, facilitating the identification of common patterns across diverse situations of potential relevance.

Table 4 (Analytical systematization) organizes the evidence according to analytical dimensions that allowed for the examination and identification of recurrent patterns while also capturing predominant theoretical and methodological approaches, in contrast to Table 3, which focuses on evidence characterization.

Table 4
Analytical systematization

Dimension	Key indicators	Principal evidence	Representative references
Risk governance	Centralization, inter-institutional coordination, corruption	Institutional deficits limit policy implementation	French et al. (2020); Greiving et al. (2021)
Community resilience	Social capital, participation, self-organization	Communities develop autonomous adaptive capacities	Flores Sánchez et al. (2023); Reid et al. (2009)
Territorial vulnerability	Informal urbanization, hazard exposure	Urban expansion in high-risk areas increases vulnerability	Moya et al. (2024); Esenarro et al. (2024)
Institutional capacities	Critical infrastructure, preparedness, resources	High structural vulnerability and limited preparedness	Obando Zegarra et al. (2023)
Knowledge management	Data use, integration of local–scientific knowledge	Gap between available information and preventive action	Rodríguez-Álvarez & Kruczkiewicz (2022)
Socioeconomic dimension	Inequality, poverty, isolation	Structural factors condition resilience	Roland et al. (2023)
Climate change	Intensification of hazards, ecosystem degradation	Increased risks and emerging threats	Emmer et al. (2025); Aponte et al. (2025)

Note. The table systematizes the main dimensions, indicators, and findings identified in the reviewed literature. Authors' own elaboration

The results show that the extensive literature is structured around five fundamental axes: risk governance, community resilience, territorial vulnerability, institutional capacities, and knowledge management. Broadly, the studies concur that disasters occurring in Peru are not merely the result of physical factors but also consequences of structural, political, institutional, and social dynamics (French et al., 2020; Lavell et al., 2023).

Similarly, the analyzed studies consistently emphasize the significant role of social capital and community organization as key elements of resilience, particularly in contexts of high vulnerability (Flores Sánchez et al., 2023; Lerner & Van Praag, 2024). Nevertheless, these contributions contrast sharply with the persistent limitation of the state in integrating these capacities into effective public policies (Recharte & Rondán Ramírez, 2024).

From a technical perspective, deficiencies were identified in data generation and information use, as well as a lack of synergy between scientific and local knowledge (Rodríguez-Álvarez & Kruczkiewicz, 2022; Aguirre et al., 2019), thus configuring a persistent knowledge–action gap.

Table 5 (Critical factors of state resilience in disaster risk management) precisely synthesizes the elements that limit the resilience of the Peruvian state in disaster risk management. These factors are clearly interconnected and organized into five dimensions: institutional governance, territorial planning, technical capacities, social dimension, and structural vulnerabilities, each relevant to the context.

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Table 5
Critical factors of state resilience in disaster risk management

Dimension	Critical factor	Synthesized evidence	Implications for Latin America
Institutional governance	Fragmentation and centralization; corruption and distrust; prevailing reactive approach	Siloed management, weak multi-level coordination; erosion of institutional legitimacy; predominance of response over prevention	Requires effective decentralization and intersectoral coordination; need for transparency and accountability; transition toward prospective risk management
Territorial planning	Informal urbanization in hazard zones; vulnerable critical infrastructure	Expansion on slopes and riverbanks; high obsolescence and systemic risk	Integrate DRM into housing and territorial planning policies; prioritize investment in resilient infrastructure
Technical capacities	Deficits in assessment and monitoring; knowledge–action gap	Limitations in data and modeling; information not translated into policy	Strengthen technical capacities and technology use; integrate scientific and local knowledge
Social dimension	Low community participation	Institutional distrust and limited inclusion	Promote participatory governance
Structural vulnerabilities	Inequality and poverty; climate change	Limit adaptive capacity; intensification of hazards	Address structural drivers of risk; incorporate adaptation approaches and nature-based solutions

Note. The table synthesizes the main factors identified, their empirical evidence, and their implications for Latin America. Authors' own elaboration

Regarding institutional governance, structural problems were identified, particularly fragmentation and centralization. These deficiencies are linked to weak coordination among the various entities responsible for risk management, evidencing the persistence of institutional "silos" that hinder intersectoral articulation and dialogue with other levels of government. Such limitations generate significant gaps between policy design and effective implementation (French et al., 2020; Greiving et al., 2021). Increasing corruption was also observed, which weakens state legitimacy and erodes public trust, with negative impacts on response capacity (Flores et al., 2025; Lerner & Van Praag, 2024).

In terms of territorial planning, limitations in land-use regulation favor informal urban expansion in high-risk areas, increasing exposure and reproducing structural vulnerabilities (Moya et al., 2024; Esenarro et al., 2024). Similarly, critical infrastructure exhibits high fragility, largely due to limited integration of resilience criteria in its design and management, raising the probability of systemic failures during adverse events (Obando Zegarra et al., 2023).

On the axis of technical capacities and knowledge management, shortcomings were identified in risk assessment, modeling, and monitoring. Lack of data and restricted use of analytical tools hinder evidence-based decision-making (Manta et al., 2018; Arana-Ruedas et al., 2025). Furthermore, a gap persists between available knowledge and its applicability in preventive actions (Aguirre et al., 2019; Ramírez & Briones, 2017).

Regarding the social dimension, community participation is limited and influenced by distrust of state institutions, although communities retain relevant organizational capacities and local knowledge (Reid et al., 2009; Pérez et al., 2025). Finally, structural factors, such as inequality, isolation, and extractivist models, condition resilience and are exacerbated by the influence of climate change (Roland et al., 2023; Emmer et al., 2025; Aponte et al., 2025).

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Discussion

This systematic review enables moving beyond a descriptive perspective toward a structural understanding of the factors conditioning the resilience of the Peruvian state in disaster risk management. According to the evidence analyzed, the resilience deficit responds both to technical limitations and to systemic failures deeply embedded in state governance structures.

Fragmented and centralized governance emerges as the primary obstacle to effective risk management. The persistence of sectorized structures hinders inter-institutional synergy and limits policy implementation across the territory (French et al., 2020; Greiving et al., 2021). This pattern contrasts with approaches that promote polycentric decision-making models to address complex systems, which would enhance response and adaptation capacities in the face of disasters (Behnke, 2024). Excessive concentration of decisions at the central level widens the gap between normative design and implementation.

Similarly, structural corruption and institutional distrust emerge as factors that weaken state resilience. Perceptions of a lack of transparency and efficiency reduce state legitimacy and limit citizen participation, especially in contexts of inequality where social trust proves fundamental (Flores et al., 2025; Lerner & Van Praag, 2024).

Regarding territorial planning, its inadequacy acts as a key mechanism in risk generation. Unregulated urban expansion in high-exposure zones increases vulnerability and reflects failures in territorial governance (Moya et al., 2024; Esenarro et al., 2024). The fragility of critical infrastructure, stemming from limited integration of resilience criteria in its design and management, highlights the systemic nature of urban risk, where sectoral interdependencies can trigger cascading failures (Obando Zegarra et al., 2023; Greiving et al., 2021).

On the axis of technical capacities and knowledge management, significant shortcomings were identified. Insufficient data, analytical tools, and modeling capacities constrain evidence-based decision-making (Manta et al., 2018; Arana-Ruedas et al., 2025). Moreover, a disconnect persists between available knowledge and its effective application in public policy, limiting preventive measures (Aguirre et al., 2019; Rodríguez-Álvarez & Kruczkiewicz, 2022).

In the social sphere, the relationship between state and society proves complex. Community participation is constrained by distrust of institutions, yet communities maintain relevant organizational capacities and local knowledge, grounded in social capital and autonomous response capabilities (Reid et al., 2009; Flores Sánchez et al., 2023). This demonstrates that resilience is a complementary process requiring adequate articulation among state actors, local communities, and other stakeholders.

Finally, structural factors, including inequality, geographic isolation, and extractivist models, significantly condition state resilience in various nations (Roland et al., 2023; Pereira & Raju, 2020). These dynamics are exacerbated by climate change, which acts as a risk multiplier and accelerates environmental degradation processes (Emmer et al., 2025; Aponte et al., 2025).

Overall, governmental resilience is a multidimensional phenomenon demanding profound transformations in governance, territorial planning, and development models. In line with the Sendai Framework for Disaster Risk Reduction (2015–2030), it is necessary to advance toward proactive risk management that not only improves response but also intervenes in the structural causes of risk. The implications of these findings extend beyond the Peruvian case, as institutional fragmentation, urban informality, and technical and institutional weaknesses are common across many Latin American countries (Pereira & Raju, 2020).

Conclusions

The meticulous analysis shows that the resilience of the Peruvian state in disaster risk management is structurally constrained and conditioned by systemic factors that exceed conventional technical approaches. The current gap between advanced normative frameworks and operational outcomes evidences the persistence of failures in risk governance, related to institutional fragmentation, centralization of decision-making processes, and weak articulation among levels of government.

The findings further confirm that disasters in Peru are closely linked to processes of social risk construction: deficient territorial planning, informal infrastructure and urbanization, and lack of land-use regulation generate increasing vulnerabilities. This compels a reorientation of analysis from reaction to events toward understanding their structural causes, which generate and perpetuate risk.

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Technical limitations, moreover, are not explained solely by a lack of information. They originate in the persistent disconnect between knowledge and action, which hinders the application of preventive measures. Knowledge governance must therefore be positioned as a key element in driving state resilience.

The study also highlights the tension between state capacities and social dynamics. While the state faces difficulties in implementing risk management policies, communities generate empirical responses based on local organization. In this context, resilience emerges as a relational process requiring multi-actor articulation, incorporating state, community, and other organizational actors.

From a theoretical perspective, there is a need to transition toward transformative approaches ("bounce forward") that address the structural causes of risk. These approaches must be grounded in polycentric and sustainable governance, the integration of risk management into development, and institutional reforms oriented toward coordination, transparency, and decentralization. In synthesis, strengthening state resilience requires addressing the structural drivers of vulnerability and incorporating prospective risk management as a cornerstone of sustainable development.

Finally, the study presents limitations, such as the exclusion of gray literature and methodological heterogeneity, which underscore the need for comparative research and empirical evaluations of governance mechanisms.

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