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Full Length Research Paper

Examining current landslide risk management technologies and their implications for land use planning and design of disaster resilient futures in landslide prone areas

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Recent decades have shown an alarming increase in disaster occurrences, especially compound and cascading events, along with significant economic losses. This situation highlights the necessity for effective disaster risk reduction and early warning systems. This study explores recent literature to understand the evolving nature of landslide disasters, identifies existing technologies, and investigates their integration into land use frameworks, particularly in areas prone to landslides, to promote sustainable futures. The study systematically reviews the literature to analyze existing landslide management technologies and their integration into land use frameworks, particularly in vulnerable regions. The findings show significant disparities in landslide research, with Asia, especially China, India, and Nepal, taking the lead in scholarship, while Africa remains under-represented despite facing severe risks. The study reveals key factors that contribute to landslide vulnerability, such as inadequate land tenure security and fragmented recovery policies. This study explores community coping mechanisms and resilience pathways, emphasizing the importance of local knowledge and participatory governance in disaster management. The study concludes that a collaborative approach integrating technological innovation, fair land-use practices, and local knowledge systems is essential for creating disaster-resilient futures. This study provides recommendations to enhance resilience in landslide-prone areas, emphasizing community-led initiatives and cross-sectoral coordination.

Key words: Landslides, disaster risk reduction, land use planning, resilience, risk management technologies.

INTRODUCTION

The evolving nature of disasters, particularly their interconnected characteristics, requires governmental entities and vulnerable communities to implement integrated and sustainable governance strategies to enhance resilience against such events (Birhanu et al., 2017; Klein et al., 2019; Glantz and Pierce, 2021).This necessity emerges irrespective of geographical context, national development levels, or historical factors, driven by the increasing loss and damage witnessed in the 21st century (World Meteorological Organization [WMO], 2021).

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From 1970 to 2019, researchers documented a five-fold increase in disasters, resulting in economic losses and damages amounting to USD 202 million, as well as a 91 percent rise in fatalities (WMO, 2021).

In the 21st century, scholars note an increase in the frequency and intensity of compound and cascading hazards, which underscores the need to reevaluate the framing of funding and organization of disaster management frameworks (Leppold et al., 2025). These efforts align with global commitments, including the Sendai Framework, which emphasizes risk awareness, reduction, prevention, and effective disaster response mechanisms (Zaidi and Fordham, 2021). Additionally, these at-risk communities need to establish resilience against future hazards by implementing proactive local measures that enhance resilience and improve adaptive capabilities in the face of climate change (Cui and Han, 2018; Fraser et al., 2021; Pandey et al., 2021; Glantz and Pierce, 2021).

Recent shifts within global disaster discourses focus on disaster risk reduction (DRR) and early warning systems (EWS) aimed at mitigating the susceptibility of vulnerable communities to disaster risks (Elsner et al., 2025; Zaidi and Fordham, 2021). However, adapting these global protocols to local contexts often proves challenging due to community disparities and policy inconsistencies (Walelign et al., 2021; Aragón-Duran et al., 2020). The multiplicity of landslide predictors complicates the efficacy of predictions (He et al., 2024; Rosser et al., 2021). This situation worsens when at-risk communities decline to relocate or implement their own adaptation strategies, which compromises slope stability and jeopardizes their mental health and well-being (Kabunga et al., 2022; Depicker et al., 2021). Recent studies, including Bucała-Hrabia et al. (2022), underscore that the recent uptick in the frequency and intensity of extreme weather events will influence landslide incidents in the imminent future. Global population growth strains the water-energy-food nexus and adversely affects vulnerable ecosystems due to increased human activities (Depicker et al., 2021). These situations emphasize the need for innovative methods to identify and mitigate landslide risks in the short term, while also providing sustainable routes for vulnerable populations through the formulation of localized land use and planning initiatives (Aschieri et al., 2024; Chen et al., 2023; Yang et al., 2024). Despite the current limitations in landslide detection, Abtahee et al. (2023) argue that employing innovative, user-friendly, and cost-effective geoinformatics can rectify the shortcomings in landslide detection, enhancing the accuracy of landslide risk zonation and guiding appropriate actions for each zone (Khan et al., 2024; Alharbi and El-Sorogy, 2023; Uluç Keçik et al., 2023).

Landslides, given their relatively minor impact on global hazard occurrences and fatalities (WMO, 2021); receive insufficient representation in disaster discourses and national disaster risk reduction action plans. Previous studies analyze landslide management through a via fragmented lens, often offering post-hazard evaluations bibliometric studies (Huang et al., 2021; Wu et al., 2014). This study offers a comprehensive view on landslide management by analyzing current literature to pinpoint existing technologies and investigating their integration into land use frameworks, especially in areas prone to landslides, to foster sustainable futures (Kong et al., 2024; Barua et al., 2023; Benzenine et al., 2023). This aligns with the current discourse on disasters and has the potential to reveal new strategies that can improve similar situations in the global south, which are frequently overlooked in the production and sharing of disaster knowledge, such as landslides. This study aims to achieve three distinct objectives by examining existing literature. This research aims to identify (1) the drivers of the diffusion of existing landslide management technologies and their applications, (2) the contribution of current land use practices to communities susceptible to landslides, and (3) the coping mechanisms or resilience pathways that communities in landslide-prone areas have developed to achieve sustainable futures.

MATERIALS AND METHODS

Data sourcing

This study conducted a systematic literature review (SLR) based on Kitchenham's, (2004) comprehensive approach, which tries to examine current literature to address relevant research issues. The review also utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) technique, which involves the processes of identification, screening, eligibility, and inclusion to streamline the gathering of pertinent data. To accomplish these tasks, the researchers followed a series of steps, including conducting search methods, reading the titles and abstracts of relevant articles, reviewing the entire text of selected articles, and ultimately including the articles that matched their criteria as adopted by Moher et al. (2010).

Data search

The review utilized two databases, namely Scopus and Science Direct during the identification stage. The selection of these databases was based on the understanding that the success of a SLR depends on employing an appropriate search strategy and utilizing suitable databases (Zhu and Liu, 2020). Two search strings were developed and used to source for appropriate literature for this study as indicated.

1) String 1: used in ScienceDirect database: *"informal social networks, disaster recovery, financial aid, disaster finance policies - limited to 2020 - 2025; research articles; social sciences; open access"*

2) String 2: used in Scopus database:

-TITLE-ABS-KEY (informal OR social OR networks OR formal OR aid OR disaster OR financial OR assistance OR land OR use OR repurposing OR recovery OR landslide OR community OR resilience) AND PUBYEAR > 2019 AND PUBYEAR < 2025) AND (landslide) AND (land AND use) AND (LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-

TO (OA , "all")) AND (LIMIT-TO (EXACTKEYWORD , "Systematic Review") OR LIMIT-TO (EXACTKEYWORD , "Sustainability") OR LIMIT-TO (EXACTKEYWORD , "Climate Change") OR LIMIT-TO (EXACTKEYWORD , "Sustainable Development") OR LIMIT-TO (EXACTKEYWORD , "Depression") OR LIMIT-TO (EXACTKEYWORD , "Social Behavior") OR LIMIT-TO (EXACTKEYWORD , "Social Support") OR LIMIT-TO (EXACTKEYWORD , "Mental Disease") OR LIMIT-TO (EXACTKEYWORD , "Risk Assessment") OR LIMIT-TO (EXACTKEYWORD , "Social Interaction") OR LIMIT-TO (EXACTKEYWORD , "Conceptual Framework") OR LIMIT-TO (EXACTKEYWORD , "Resilience") OR LIMIT-TO (EXACTKEYWORD , "Systematic Literature Review") OR LIMIT-TO (EXACTKEYWORD , "Wellbeing") OR LIMIT-TO (EXACTKEYWORD , "Social Status") OR LIMIT-TO (EXACTKEYWORD , "Communication") OR LIMIT-TO (EXACTKEYWORD , "Innovation") OR LIMIT-TO (EXACTKEYWORD , "Governance Approach") OR LIMIT-TO (EXACTKEYWORD , "Vulnerability") OR LIMIT-TO (EXACTKEYWORD , "Social Network")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "ar"))

The study's focus on recent scholarship led to the decision to limit the time frame to 2020 to 2025. The search on the SCOPUS database focused on Open Access peer-reviewed journals published in English within the discipline of social sciences. The authors applied similar filters to the Science Direct database. The search yielded a total of 770 papers from the two databases.

Data screening

The authors uploaded the 770 articles downloaded as .rif files from the search procedures in the two databases into Covidence for screening. The first level of screening identified and removed duplicates while screening the titles of the articles. The exclusion of 531 articles occurred as a result. I subjected the remaining 239 articles to full abstract reading as a second level of screening, which resulted in the removal of 88 articles. The researchers conducted a full-length reading of the articles during the third level of screening. This level resulted in the exclusion of 80 articles. The study included the remaining 71 papers as suitable for inclusion. The team extracted data to input into the online Excel analysis platform aligned with the study objectives. Figure 1 illustrates the inclusion and exclusion criteria used to derive the 71 articles selected for this study.

Data analysis

The study established a cohesive process to extract and review the identified literature in order to address the three guiding questions. The first author compiled all the articles into an online Excel file, where all processing was jointly conducted. The researchers produced themes that aligned with the study objectives by utilizing the reflective thematic analysis framework (Braun and Clarke, 2006). This framework emphasizes drawing conclusions from the data. The data extraction and analysis were based on the following primary themes: (a) mapping the current diffusion of landslide management techniques, (b) identifying where the techniques are being applied, (c) exploring justifications for adopting land management practices, and (d) assessing implications for designing sustainable futures. This formed the basis for development of future policy and practice paths for communities impacted by landslides. Two teams were formed to conduct tests for thematic and inter-judge reliability, reinforcing the reflective thematic analysis outlined earlier. Subsequent discussion presents the results of various procedures.

RESULTS

Situating existing landslide management approaches and rationale for their adoption

Recent studies, including those by Wang et al. (2023), demonstrate that six of the top ten nations most susceptible to landslide events globally are located in Asia: China, Afghanistan, India, the Philippines, Indonesia, and Nepal. Additionally, half of these nations lie along the Himalayan ranges, one of the world's most active seismic regions. This area experiences numerous cloud burst events and monsoon seasons that increase precipitation and trigger landslides (de Souza et al., 2023; Yang et al., 2024).

Mapping landslide scholarship

Fifty-three studies from twenty-two countries addressed the first objective. Figure 2 shows how contemporary landslide management techniques contribute to the field. China plays a significant role, contributing 40% of the evaluated papers. Only three studies (6%) occurred in Africa, primarily conducted by foreign nationals. India and Nepal contribute notably to recent research; however, their contributions appear comparatively minor when contrasted with those of China, with which they share the Himalayan Range. Turkey, Greece, and Italy lie in active seismic zones, leading to significant contributions mainly from recent catastrophic landslide events.

Rationale for adoption of current Landslide management approaches

The multiplicity of landslide predictors complicates its prediction, and the increasing frequency and severity of extreme weather events prompt a review of existing disaster scholarship (Mehta et al., 2021; Zaidi and Fordham, 2021). This situation calls for the adoption of critically reflexive and interdisciplinary approaches to knowledge production and participatory governance (Fazey et al., 2018). The proposed approaches leverage the descriptive, diagnostic, predictive, and prescriptive attributes of contemporary epistemologies, including algorithm-based machine learning (Lin et al., 2024; Gui et al., 2023; Lu et al., 2023). The findings of this study categorize the rationale for adopting novel approaches to landslide management into seven broad areas, as indicated in Table 1.

Mapping the contribution of current land use practices to landslide vulnerability

The studies reviewed identify four primary factors that

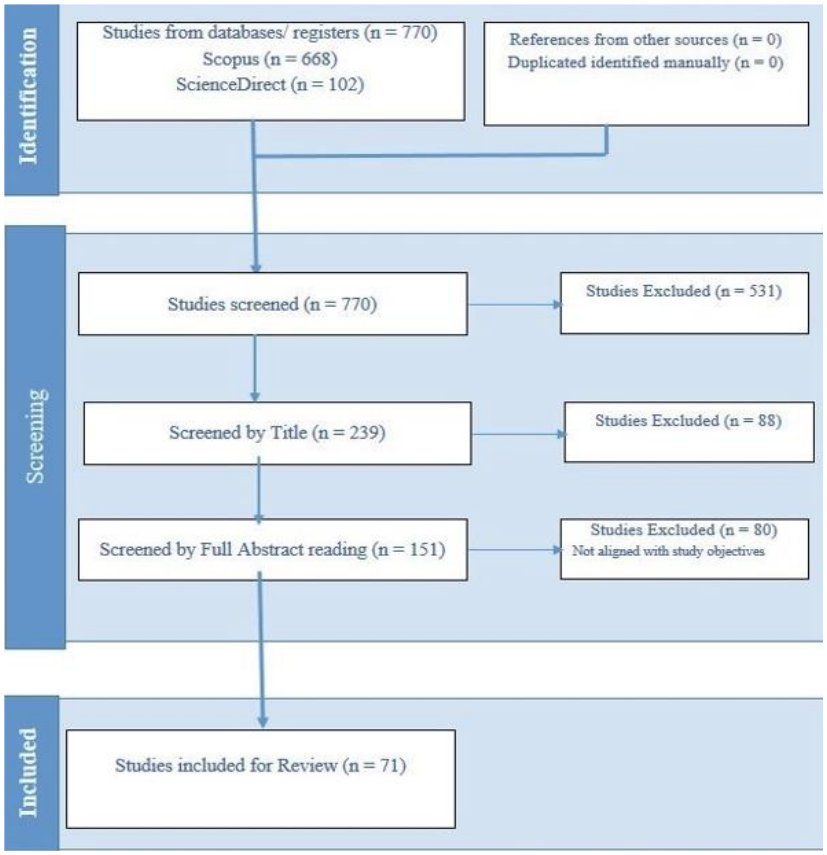


Figure 1. Flow diagram indicating inclusion and exclusion criteria of studies selected.
Source: Author's creation.

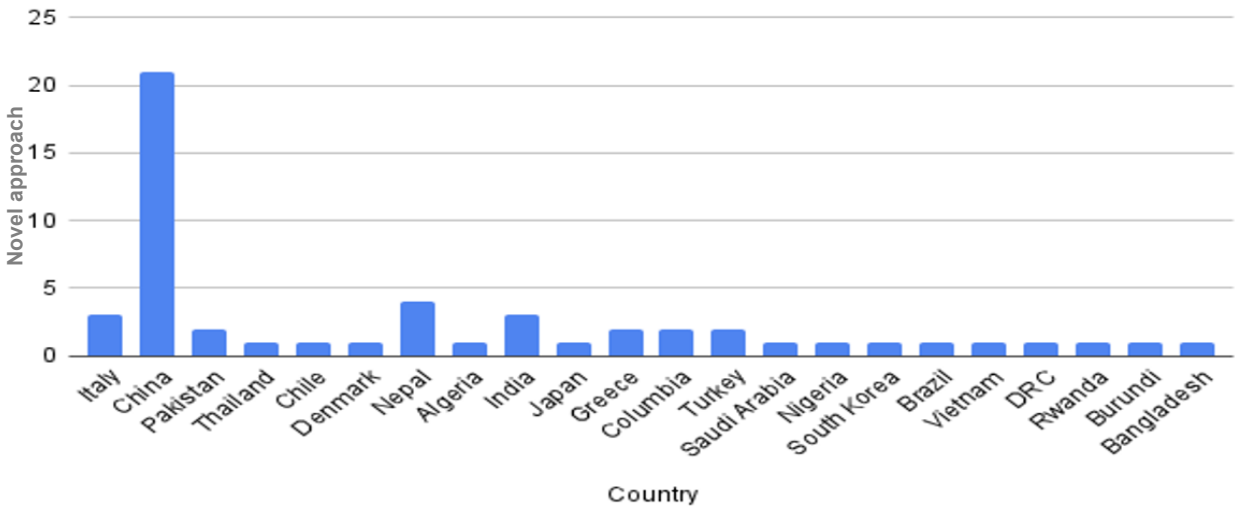


Figure 2. Origin of novel approaches to landslide management.
Source: Author's creation.

contribute to landslide vulnerability, distinguished by inadequate preparedness over time and space: insecurity in common land tenure systems (Jannah et al., 2024), weak land zonation frameworks (Barbosa and Walker, 2020), limited access to resources for sustainable livelihoods (See et al., 2025), and fragmented post-

Table 1. Rationale for adoption of novel landslide management approaches.

S/N	Rationale	Narrative	Studies
1	Improved landslide risk management	Enhances design of landslide future scenarios using contextual and evidence-based data.	Ageenko et al. (2022), Gui et al. (2023) and Shi et al. (2024)
2	Promotes land use planning	Provision of accurate and place-specific data to inform land use planning and zonation	Abtahee et al. (2023), Barua et al. (2023), Benzenine et al. (2023) and Kong et al. (2024)
3	Enhances data management	Fosters collection, analysis and dissemination of geospatial data for multiple stakeholder use	Kim and Lee (2023); Kumthekar et al. (2024); Rosser et al. (2021) and Tan et al. (2024)
4	Fosters generation of landslide susceptibility maps	Enhances zonation of landslide prone areas through development of risk maps	Alharbi and El-Sorogy (2023), He et al. (2024), Khan et al. (2024) and Keçik et al. (2023)
5	Enhances landslide prediction	Optimizes existing data to develop predictive models and analyze previous landslide events	Akintan et al. (2023), Li et al. (2021), Lin et al. (2024) and Zhang et al. (2024)
6	Enhances landslide detection	Leverages existing methodologies to enhance detection and management of landslide hazards	Aschieri et al. (2024), Chen et al. (2023) and Yang et al. (2024)
7	Aids design of metrics to measure social vulnerability e.g. social vulnerability index	Create and integrate data to support the design of adaptive frameworks that assess social vulnerability to landslides	Ageenko et al. (2022); Kumthekar et al. (2024); Maragaño-Carmona et al. (2023) and Yin et al. (2024)

Source: Created by authors from studies reviewed.

disaster recovery and reconstruction policies (Yin et al., 2024; Maragaño-Carmona et al., 2023); disaster risk management activities (Aragón-Duran et al., 2020; Walelign et al., 2021). Similarly, Jannah et al. (2024) explored the adoption of the Islamic wafq land management system to conserve ecologically sensitive forest resources. The researchers concluded that the interaction of religious and other cultural social capital drivers within this framework ensured community land tenure and facilitated the ecological conservation of valuable ethno-botanical plant species. This approach reinforced various social attributes, highlighting the financial and physical characteristics of a location through eco-tourism. Their findings align with previous research by Asada and Minagawa (2023), demonstrating the essential role of ecological conservation in preventing and managing shallow landslides.

This scholarship critically examines the recovery processes that unfold after disasters and investigates the dynamics of urban marginalization. Barbosa and Walker (2020) explored post-landslide zonation and found that the epistemic and ontological differences between favela dwellers affected by landslides and other disaster risk reduction stakeholders, who do not reside in these areas, resulted in top-down orientated policies. Non-state actors perceive these policies as disenfranchising and silencing the best interests of favela residents. See et al. (2025) examine post-landslide interventions in coastal communities and highlight that prevalent relocation strategies focus on land allocation for agriculture in regions further inland, impacting coastal populations affected by landslides. Disruptions in livelihoods, from fishing to agriculture, and the sense of place present serious challenges for post-landslide sustainability in these coastal communities. Additionally, Taiban et al. (2020) highlight that governmental efforts in post-disaster relocation frequently neglect the perspectives and security of local populations, particularly concerning agricultural land ownership.

A study by Aragón-Duran et al. (2020) connects legal constraints on post-landslide relocation and the establishment of no-build zones to a reduction in public utility expenditures by local governments serving displaced communities. These constraints on place-based livelihood development pathways heighten community vulnerability by increasing disaster risk. This

effect becomes particularly evident as communities resist restrictive regulations or face limited access to remittances from relatives for post-disaster recovery. Correspondingly, Walelign et al. (2021) and Aragón-Duran et al. (2020) demonstrate that policy mismatches negatively impact agricultural communities because of differing understandings between local populations and policy actors. Chen et al. (2023) and Lin and Lin (2020) argue that policy actors must prioritise cultural aspects of livelihoods, such as creative and transformative local knowledge-based tourism, over spatial considerations when developing post-disaster resilience strategies for relocated communities. This approach enhances local adaptation, increases household farm income, and strengthens place-based climate resilience trajectories.

Coping mechanism or resilience pathways adopted by communities in landslide prone areas to design sustainable futures

Obtainable studies show that various factors motivate communities in landslide-prone areas to adopt resilience coping mechanisms. Kandel et al. (2023) examined landslides in Nepal and discovered that state-led agro-ecological zonation affects the spatial relationship between communities and their livelihood strategies, influencing their choices for climate change adaptation. The findings suggest that farmers in the highest elevations (mountainous regions) are more likely to adopt agroforestry, small-scale irrigation, and economic migration as strategies for adaptation. Farmers in the middle-lying zones (hilly regions) prefer early maturing crops, engage in temporary labor-based migration, and participate in off-farm activities. Lastly, farmers in the lowest lying zones adopt new crop varieties, engage in temporary labor-based migration, and implement small-scale irrigation to support their livelihoods. In passing, more analysis appears to show a connection between the situated agency of at-risk populations and their marginalization. Poudel et al. (2023) show that vulnerable urban and peri-urban communities respond to the adverse impacts of urban sprawl driven by economic interests influencing state development by increasing the density of their settlements. This response may increase the likelihood of fires and the spread of infectious diseases. Their study further revealed that non-native migrants are drawn to these marginal areas, potentially leading to landslides and other disasters that activate underlying communal power dynamics. These dynamics disproportionately affect non-natives, particularly when others perceive them as more affluent and believe they gain unfair advantages from weak governance frame-works. Additionally, this laxity in governance result in poor enforcement of building codes during post-disaster reconstruction heightens the risk of disasters like earthquakes.

The results appear to suggest that communities have built self-sufficient defenses against restrictive state measures that create and reinforce vulnerability. Liu et al. (2024) demonstrate that cultural education and economic empowerment facilitate the participation of at-risk communities in DRR activities at all levels. Esposito et al. (2023) emphasize the importance of strong linking social capital and effective grassroots teams of first responders who conduct door-to-door risk warnings in enhancing disaster response and rescue efforts. These factors enhance recognition and response to disaster warnings and facilitate the evacuation of buildings identified as high risk. Moreover, the results highpoint how those prior studies connect state (in)action to either facilitating or reducing community responses to landslides and other natural hazards. For instance, Esposito et al. (2023) demonstrate that changes in land use by state actors, including the creation of artificial channels to reroute rainfall, raise sedimentation levels in the foothills and may promote unchecked vegetation growth, potentially leading to landslides and flooding. Furthermore, Del Lama Soares and Horne (2025) demonstrate that when state and non-state actors in DRR operate independently, they create fractured policy frameworks that hinder the sharing of vital resources, such as financial assets and human capital, to cooperatively carry out disaster risk management activities (Ageenko et al., 2022).

DISCUSSION

This systematic review reveals that although landslide risk management technologies have advanced significantly, their effectiveness continues to vary across regions. This should not be taken for granted, given that available data indicate that Asia particularly countries such as China, India, and Nepal faces high susceptibility to landslides due to geographical and climatic factors. Consequently, Asia, especially the aforementioned countries, appears to demonstrate a remarkable focus on scholarship and implementation, while Africa remains relatively underrepresented (Wang et al., 2023; Akintan et al., 2023). These findings align with earlier research by Huang et al. (2022) and Wu et al. (2014), who conducted a bibliometric analyses of over 20,000 and 10,000 studies on landslides respectively from 1982 to 2021. Their analyses showed that the majority of author clusters and research regions were situated in North America, Western Europe, and East Asia, with the USA and China emerging as the clear leaders in global landslides research based on the number of independent and collaborative articles.

These findings present serious challenges for Africa and other at-risk areas that are disproportionately underrepresented in the generation and diffusion of landslide risk knowledge. For instance, like Uganda's

Elgon slopes (Kabunga et al., 2022) and the western arm of the Great Rift Valley (Serwajja et al., 2023) face recurrent and devastating landslides but remain under-represented in open access publications. Commercial interests that drive the global extractives sector promote slope instability through mining and unregulated settlement, particularly in the Democratic Republic of Congo (Depicker et al., 2021). Scenarios where commercial interests intersect with weak disaster governance frameworks amplify disaster risk, loss, and damage. Researchers have recently focused on the global south in the context of a global race for rare earth minerals (Boafo et al., 2024). This reinforces the need for deliberate efforts to increase disaster scholarship from these regions as a mechanism to reduce disaster risk, loss, and damage through the development of enhanced and evidence-based disaster management frameworks.

Previous studies such as Wu et al. (2014) underscored the interdisciplinary nature of landslide studies and their emphasis on the need for integration of advanced predictive technologies and participatory governance (Lin et al., 2024). Consequently, this led to the emergence of novel approaches that leverage machine learning, susceptibility mapping, and geospatial analytics, transforming the identification of high-risk zones and enhancing predictive accuracy (Shi et al., 2024; Gui et al., 2023; Lu et al., 2023). These novel machine learning approaches have linked to accurately predicting rainfall return periods (Abbate and Mancusi, 2024) and bridging gaps in incomplete databases (Tan et al., 2024). However, their efficacy and uptake, particularly in data-scarce contexts of the global south, remain complex. Governments in the global south face significant hurdles in leveraging Artificial Intelligence systems to reduce disaster risk from compound and cascading hazards due to prohibitive overhead costs and intellectual property rights.

However, while the proposed frameworks aim to enhance risk management, land use planning, and data management (Kim and Lee, 2023; Kumthekar et al., 2024; Rosser et al., 2021; Tan et al., 2024), they overlook the socio-cultural dynamics, such as social capital and reflexive local disaster epistemic knowledge that influence local communities' resilience. While the connection between social capital and community disaster resilience remains contested, recent studies like Zhao et al. (2025) argue that social capital strengthens community resilience against both human-induced and natural disasters. The study findings connect social capital to the enhancement of reflexive social learning, mobilization for collective action, efforts toward disaster preparedness, risk communication, and the elicitation of moral and civic duties among at-risk communities. These linkages boost community engagement throughout the preparedness, response, and recovery phases. These also serve as crucial pillars for disaster management aspects. For instance, evidence from Indonesia indicates that community-led systems, such as Waqf-based forest management, enhance ecological resilience (Jannah et al., 2024). Conversely, weak land tenure security, unregulated settlement expansion, and poorly enforced land-use zoning exacerbate vulnerability (Mendes Barbosa and Walker, 2020; See et al., 2025). The findings reveal the messy nature of disaster recovery, underscoring that adaptive capacity can emerge from state-led marginalization. Some communities develop self-sufficient defenses such as agroforestry, climate-smart agriculture, and local disaster preparedness networks (Kandel et al., 2023; Esposito et al., 2023). However, the lack of cohesive and inclusive disaster risk management frameworks hampers effective collaboration between state and non-state actors (Taiban et al., 2020; Chen et al., 2023). Mismatches between state and non-state actors link to the “socio-spatial production of risk and vulnerability” (Huang, 2018:6), which can impede the creation of sustainable community disaster resilience. Furthermore, disjointed legislative frameworks that fail to consider the vulnerabilities of at-risk communities and their local disaster knowledge can lead to inconsistencies in policy and climate-resilient strategies (Pandey et al., 2021). Consequently, Elkady et al. (2024) emphasize the necessity of integrating informal strategies to enhance formal ones, which are often layered and present systemic barriers such as bureaucratic uncertainty, legislative frameworks, and lengthy processes that can negatively impact emergency response. The authors argue that disaster management frameworks can improve by incorporating situational awareness, sense making, and social networks. This enhancement will boost monitoring, decision-making, resource coordination, and collective learning, which are crucial for community improvisation during disaster response and can serve as a catalyst for preparedness, risk reduction, and recovery. The findings of this study support Fazey et al. (2018), who argue that resilience encompasses both technical and socio-political dimensions. Achieving sustainable futures in landslide-prone areas reinforces the need to adopt interdisciplinary, participatory, and equity-driven approaches.

Implications for research, policy, and practice

Policy

Policymakers need to emphasize the integration of local knowledge and cultural practices into landslide management strategies by recognizing the role of community-led initiatives in enhancing ecological resilience through community engagement. Furthermore, policy efforts need to address issues concerning land tenure security by establishing clear and enforceable land rights. This approach will reduce vulnerability and enhance community resilience against landslides. Policy measures should encourage inclusive and context-sensitive post-disaster recovery pathways that consider the unique

needs and perspectives of affected communities, particularly in marginalized urban areas.

Research

Research efforts need to concentrate on under-represented regions, especially in Africa, to improve the understanding of landslide risks and management practices across diverse geographical contexts. Future studies need to implement interdisciplinary methodologies that combine technical advancements in predictive modelling with socio-cultural dynamics to enhance understanding of community resilience and disaster risk management. Finally, researchers needs to carry out longitudinal studies to evaluate the effectiveness of community-led resilience strategies, especially in response to evolving environmental and socio-economic conditions.

Practice

Ground practice measures in trust-centred and participatory governance models that involve local communities in decision-making processes related to land use planning and disaster risk management. Targeted investment in capacity-building programs empowers local communities with knowledge and skills for disaster preparedness and response, including training in agroforestry and climate-smart agricultural practices. Enhancing data management systems is essential to facilitate the collection, analysis, and dissemination of geospatial data among stakeholders. This ensures that all relevant parties access critical information for effective landslide risk management.

Study limitations

This study relies on peer-reviewed Open Access journals published in English and sourced from the SCOPUS database, which presents limitations to the findings. Excluding insights from grey literature and subscription journals limits the generalisation of the findings from this study. The reliance on publications in English obscures insights from publications in other languages. Limiting the search to the discipline of social sciences presents obstacles to gaining interdisciplinary insights into landslides.

Conclusion

This study demonstrates that landslides represent a multi-causal and socially embedded hazard, with impacts that reach beyond physical destruction to include psychological, cultural, and livelihood dimensions. Advanced geo-information technologies and predictive models show promise, but their utility relies on local adaptation, institutional support, and participatory governance. Land use practices play a crucial role: when they are poorly regulated, they increase risk, but when they are guided by ecological and cultural principles, they strengthen resilience. Communities in landslide-prone areas actively develop adaptive strategies, but they need reinforcement through enabling policy environments. In conclusion, creating disaster-resilient futures in landslide-prone areas requires a collaboration of technological innovation, fair land-use planning, and the appreciation of local knowledge systems.

RECOMMENDATIONS

From the review, it was recommended that:

a) To mainstream indigenous knowledge; Governments and NGOs should systematically incorporate local coping mechanisms and traditional land-use practices into DRR frameworks (Bayrak, 2022).
b) In the direction of expanding Investment in Early Warning Systems (EWS); User-friendly, cost-effective geospatial and AI-based predictive tools should be scaled to community levels (Gui et al., 2023; Zhang et al., 2024).
c) Towards strengthening Land Tenure and Zoning Frameworks; Secure tenure and enforceable land-use regulations must accompany relocation or land-use repurposing programs (Jannah et al., 2024).
d) In a bid to promote community-led resilience building; Support grassroots organizations to conduct awareness campaigns, organize first responder teams, and facilitate inclusive decision-making (Esposito et al., 2023).
e) In order to enhance cross-sectoral coordination; Integrated DRR and climate change adaptation frameworks should bring together state, non-state and private actors to pool financial and human resources (Del Lama Soares and Horne, 2025).
f) To address research gaps in Africa; Academic and funding institutions should support empirical and technological research on landslides in African contexts where the risks are escalating but scholarship remains limited (Akintan et al., 2023).

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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