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School management's disaster risk reduction approaches in flood-affected schools in South Africa's Vhembe District: A literature review

Azwidowi Aubrey Mokwebo[1]

[1] Faculty of Humanities, Social Sciences and Education, Department of Educational Studies, University of Venda, University Road, Thohoyandou, Limpopo, Private Bag X5050, Thohoyandou, 0950, South Africa.

ABSTRACT

Flooding remains one of the most disruptive climate-related hazards affecting schools in rural South Africa, compromising infrastructure, learner safety, and continuity of education. In the Vhembe District of Limpopo Province, recurrent flood events have exposed weaknesses in school preparedness, governance systems, infrastructure resilience, and learning continuity mechanisms. Despite growing scholarship on disaster risk reduction and school safety, limited attention has been paid to how school management practices contribute to institutional resilience in flood-prone rural schools. This study examined Disaster Risk Reduction (DRR) approaches relevant to flood-affected public schools and explored how school management practices contribute to institutional resilience. Guided by Disaster Resilience Theory (DRT), the study adopted a qualitative desktop-based systematic literature review using the PRISMA 2020 framework. Literature published between 2014 and 2026 was sourced from academic databases and institutional repositories. Following the application of inclusion and exclusion criteria, ten South African studies were selected and analysed through thematic synthesis. The findings revealed three interrelated themes: governance, risk reduction and school resilience; infrastructure vulnerability and preparedness challenges; and educational continuity during disruptions. The review found that weak institutional capacity, fragmented governance structures, inadequate hazard mapping, poor infrastructure, and limited preparedness continue to undermine school resilience. Furthermore, digital inequalities and the absence of formal continuity-of-learning systems constrain educational continuity during disaster-related disruptions. The study proposes the Vhembe School Disaster Resilience Model, comprising four pillars: risk anticipation, structural absorption, governance and preparedness, and continuity-of-learning adaptation. The model offers practical guidance to strengthen resilience in flood-prone rural schools.

Keywords: Disaster Risk Reduction, Disaster Resilience, School Resilience, Flood Preparedness, Educational Continuity, School Management, Vhembe District.

INTRODUCTION

Globally, climate-related hazards pose an escalating threat to education systems, with systematic evidence showing that floods and other extreme events damage school infrastructure, prolong closures,

CORRESPONDENCE – Azwidowi Aubrey Mokwebo **Email:** Aubrey.Mokwebo@univen.ac.za
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and deepen inequities in access and continuity of learning.[1] Building on this global picture, Southern Africa has experienced increasingly frequent short-duration, high-intensity rainfall that precipitates flooding in rural areas, compounding social and infrastructural vulnerabilities.[2]

Within South Africa specifically, research documents recurrent flood losses and uneven preparedness, particularly gaps in early warning uptake and in localized response planning, leaving communities and public services exposed.[3] On the local scale, Limpopo's Vhembe District exhibits increased vulnerability due to its geographic exposure, fragile access routes, and limited adaptive capacity factors that directly affect schools' ability to function during hydrometeorological events.[4] Taken together, these multi-level patterns underscore the need for school-level capabilities to anticipate, absorb, adapt, and recover from shocks, consistent with Disaster Resilience Theory.[5]

In response to this layered risk context, this review evaluates disaster risk reduction (DRR) approaches in flood-affected public schools in the Vhembe District, analysing how school management practices shape institutional resilience under recurrent flood risk. The synthesis draws on peer-reviewed literature and scholarly reports (2020–2026) on governance, infrastructure, pedagogy, and school–community partnerships. Although international and regional scholarship affirms the promise of DRR education, Comprehensive School Safety, and inclusive DRR models,[6] implementation in South Africa remains uneven and inconsistently embedded in institutional routines.[7] Consequently, key uncertainties persist about how schools (and SMTs) operationalise early warnings, budget and procure for DRR, and coordinate inclusive, practice-oriented measures in rural settings.[8]

To address these uncertainties, DRT offers a conceptual anchor: it conceives resilience as the capacity of institutions to resist, absorb, accommodate, adapt to, transform, and recover while preserving essential functions, an apt lens for schools experiencing recurrent floods.[9] From a practical standpoint, empirical studies link flood-related disruptions with lost instructional time, psychosocial strain, and widening rural–urban disparities, particularly in areas with weak infrastructure and limited preparedness.[10] From a societal equity perspective, rural learners in Limpopo face compounding barriers to transport, connectivity, and safe facilities, making institutionalised DRR a prerequisite for progress toward SDG 4 (Quality Education) and SDG 13 (Climate Action).[11] These combined arguments, conceptual, practical, and societal, motivate a focused, management-centred review in Vhembe. Despite growing policy attention, scholarship identifies persistent implementation gaps in the school sector:

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[1] Anushree Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review," *Development Studies Research* 10, no. 1 (December 31, 2023), https://doi.org/10.1080/21665095.2023.2202826.;L. A. R. Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. ," *Education and New Developments* 2 (June 28, 2025), https://doi.org/10.36315/2025v2end041.

[2] Rendani B. Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa," *Water* 13, no. 24 (2021): 3490; Wilfred Lunga et al., "Critical Zones, Disaster Risk Science, and Education for Sustainable Development in Africa," *Frontiers in Education* 10 (December 15, 2025), https://doi.org/10.3389/feduc.2025.1635554.

[3] Tlou D. Raphela and Mollin Matsididi, "The Causes and Impacts of Flood Risks in South Africa," *Frontiers in Water* 6 (January 7, 2025), https://doi.org/10.3389/frwa.2024.1524533; Tiana Koen et al., "Assessing the Integration between Disaster Risk Reduction and Urban and Regional Planning Curricula at Tertiary Institutions in South Africa," *The Journal for Transdisciplinary Research in Southern Africa* 20, no. 1 (April 24, 2024), https://doi.org/10.4102/td.v20i1.1451.

[4] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa."

[5] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)," 2017, https://www.undrr.org/terminology/resilience.

[6] Wonder Masocha et al., "Disaster Risk Reduction Integration into School Curriculum: A Global Analysis," *European Journal of Sustainable Development Research* 9, no. 1 (January 2, 2025): em0276, https://doi.org/10.29333/ejosdr/15820; Nurul H. Rofiah, Norimune Kawai, and Elli N. Hayati, "Disability-Inclusive Disaster Risk Reduction in Schools: A Confirmatory Factor Analysis," *Jàmbá: Journal of Disaster Risk Studies* 16, no. 1 (July 11, 2024), https://doi.org/10.4102/JAMBA.v16i1.1559.

[7] Koen et al., "Assessing the Integration between Disaster Risk Reduction and Urban and Regional Planning Curricula at Tertiary Institutions in South Africa."

[8] Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review"; Koen et al., "Assessing the Integration between Disaster Risk Reduction and Urban and Regional Planning Curricula at Tertiary Institutions in South Africa."

[9] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)."

[10] Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. "; Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review."

[11] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa"; Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. ."

limited DRR mainstreaming within organisational systems, weak alignment between curriculum-level DRR and practical school-based measures, and a scarcity of flood-specific evaluations in rural South African contexts.[12]

METHODOLOGY

This study used a qualitative desktop-based literature review to examine Disaster Risk Reduction (DRR) practices and learning continuity strategies relevant to flood-affected schools in the Vhembe District, Limpopo Province. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework guided the review to improve transparency, methodological rigor, and reproducibility in the identification, screening, selection, and synthesis of literature.[13] The review was also based on principles of systematic evidence synthesis to map the current knowledge related to school resilience, flood preparedness, governance capacity, and educational continuity in climate-vulnerable contexts. The review sought to answer the following research questions:

1. How do governance, risk reduction practices, and institutional capacity influence resilience in South African schools?
2. What infrastructure vulnerabilities and preparedness challenges affect resilience in disaster-prone school contexts?
3. How do continuity-of-learning mechanisms contribute to educational resilience during disaster-related disruptions?
4.

Identifying relevant studies

Following the Guidelines on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020),[14] a systematic search strategy was developed to identify relevant literature on Disaster Risk Reduction (DRR), school resilience, flood preparedness, and learning continuity in flood-affected educational settings. To enhance the comprehensiveness and rigour of the search process, keywords were refined through preliminary database searches and consultation of relevant literature in disaster management, educational leadership, climate resilience, and school safety. This approach aligns with established recommendations for conducting transparent and reproducible literature reviews.[15] Boolean operators (AND, OR) were employed to broaden and refine search results, ensuring the retrieval of studies directly relevant to the review objectives.

The following search string guided the review:

"School management," "Disaster Risk Reduction," "DRR," "disaster preparedness," "school resilience," and *"disaster resilience"*), climate-related hazards (*"flooding," "flood-affected schools," "climate-related disruptions,"* and *"extreme weather events"*), educational settings (*"schools," "primary schools," "secondary schools," "education,"* and *"learning continuity"*), and geographical contexts (*"South Africa," "Limpopo," "Vhembe," "Africa,"* and *"Global South"*). Additional search terms included *"hazard mapping," "early warning systems in schools," "climate-smart schools," "educational continuity during disasters," "school disaster management," "school preparedness," "school safety,"* and *"climate-resilient education systems."* Boolean operators (AND and OR) were used to combine and refine these terms during the search process.

To ensure that the review reflected recent developments in disaster risk reduction, climate adaptation, and educational resilience, only studies published between **2014 and 2026** were considered

[12] Koen et al., "Assessing the Integration between Disaster Risk Reduction and Urban and Regional Planning Curricula at Tertiary Institutions in South Africa"; Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review."

[13] Matthew J Page et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews," *BMJ*, March 29, 2021, n71, https://doi.org/10.1136/bmj.n71.

[14] Page et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews."

[15] Micah D J Peters et al., "Updated Methodological Guidance for the Conduct of Scoping Reviews," *JBI Evidence Implementation* 19, no. 1 (2021): 3–10; Mai T. Pham et al., "A Scoping Review of Scoping Reviews: Advancing the Approach and Enhancing the Consistency," *Research Synthesis Methods* 5, no. 4 (December 24, 2014): 371–85, https://doi.org/10.1002/jrsm.1123.

for inclusion. The search included peer-reviewed journal articles, government policy documents, disaster management frameworks, institutional reports, and publications from recognised international organisations. Forward and backward citation tracking was also carried out to identify additional relevant studies not captured through database searches.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Population	School principals, School Management Teams (SMTs), educators, school governing structures, disaster management officials, and stakeholders involved in Disaster Risk Reduction (DRR), school resilience, and educational continuity.	Studies focusing exclusively on learners, higher education students, university administrators, or populations unrelated to school-based DRR and resilience.
Type of School	Public primary and secondary schools affected by floods, climate-related disruptions, or disaster risks.	Independent schools, private schools, special schools, higher education institutions, technical and vocational institutions, and non-school organisations.
Concept	Studies examining Disaster Risk Reduction (DRR), school resilience, flood preparedness, hazard mapping, early warning systems, climate-smart infrastructure, disaster governance, emergency preparedness, DRR education, and learning continuity during disasters.	Studies focusing solely on general educational outcomes, curriculum delivery, educational technology, or disaster contexts unrelated to school resilience and flood risk management.
Context	School settings affected by floods, climate-related hazards, and environmental disruptions, including educational continuity and emergency response measures.	Studies conducted in non-educational settings or those unrelated to disaster preparedness, climate resilience, or continuity of learning.
Geographical Scope	South African studies were prioritised, particularly those focusing on Limpopo Province and the Vhembe District. Relevant studies from Sub-Saharan Africa and comparable Global South contexts were also included.	Studies conducted exclusively in high-income countries with limited relevance to South African or Global South educational contexts.
Study Design	Peer-reviewed qualitative, quantitative, mixed-methods, case studies, phenomenological studies, surveys, systematic reviews, scoping reviews, policy analyses, and institutional reports from recognised organisations.	Editorials, book reviews, conference abstracts, opinion pieces, commentaries, and sources that lack sufficient methodological or conceptual rigour.
Publication Status	Peer-reviewed journal articles, government reports, policy documents, disaster management frameworks, and publications from recognised organisations such as UNESCO, UNICEF, DBE, and NDMC.	Unverified publications, inaccessible full texts, and sources lacking credibility or identifiable authorship.
Language	English-language publications.	Publications written in languages other than English.
Publication Period	Studies published between 2014 and 2026.	Studies published before 2015 or after 2026.
Quality Criteria	Studies demonstrating methodological transparency, clear objectives, credible findings, and relevance to DRR, school resilience, or learning continuity.	Studies with inadequate methodological information, weak evidence, or limited relevance to the review objectives.

Outcome Focus	Studies reporting on school resilience, flood preparedness, hazard identification, emergency planning, infrastructure resilience, DRR governance, stakeholder collaboration, early warning systems, DRR education, or continuity-of-learning strategies during disasters.	Studies that do not report outcomes related to disaster risk reduction, educational resilience, flood management, school preparedness, or learning continuity.

Literature Sources (Databases)

Literature was sourced from electronic databases and institutional repositories commonly used in education, disaster management, climate resilience, and social science research. These included Scopus, Web of Science, ERIC, EBSCOhost Academic Search Premier, Google Scholar, Sabinet African Journals, and African Journals Online (AJOL). To capture policy- and practice-oriented evidence, additional sources were retrieved from institutional repositories and official websites, including the South African Department of Basic Education (DBE), the National Disaster Management Center (NDMC), UNESCO, UNICEF, and the United Nations Office for Disaster Risk Reduction (UNDRR). These sources were selected because they provide extensive coverage of disaster risk reduction, educational resilience, climate adaptation, and school safety literature. To strengthen the search process and ensure comprehensive coverage of the available evidence, forward and backward citation tracking was conducted using Google Scholar's "cited by" and "related articles" functions. Reference lists of included studies, policy documents, and institutional reports were also manually searched to identify additional relevant publications that may not have been captured through the database search. This multi-source search strategy is recommended for systematic literature reviews because it enhances comprehensiveness, reduces publication bias, and minimises the likelihood of omitting relevant evidence.[16]

Study Selection

All retrieved records were exported to a reference management system for organisation and screening. The study selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines and consisted of four stages: identification, screening, eligibility assessment, and inclusion.[17] Duplicate records identified across databases and repositories were removed before screening. The screening process was conducted in three phases: title screening, abstract screening, and full-text review. During title and abstract screening, studies that did not meet the inclusion criteria were excluded. Subsequently, articles considered potentially relevant were subjected to full-text review to assess their eligibility against the predefined inclusion and exclusion criteria. The study selection process is documented in the PRISMA-ScR flow diagram below.[18]

[16] Peters et al., "Updated Methodological Guidance for the Conduct of Scoping Reviews."Page et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews."

[17] Page et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews."

[18] Andrea C. Tricco et al., "PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation," *Annals of Internal Medicine* 169, no. 7 (October 2, 2018): 467–73, https://doi.org/10.7326/M18-0850.

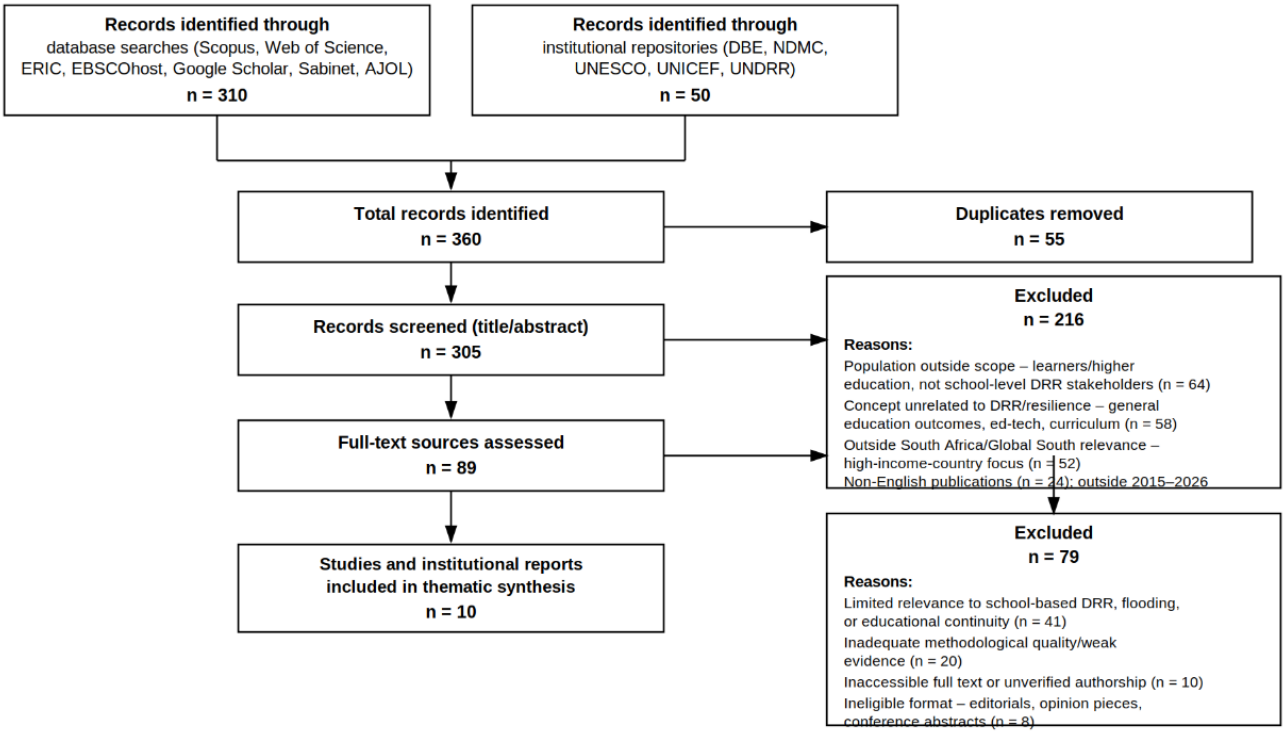


Figure 1: Preferred reporting of items for Systematic reviews and Meta-analyses flow diagram for selection of studies.

To improve the reliability and transparency of study selection, each article was assessed against the predetermined inclusion and exclusion criteria. The selection process was documented using a PRISMA 2020 flow diagram (Figure 1), which provides a visual representation of the identification, screening, eligibility, and inclusion stages. This systematic approach ensured that only studies directly relevant to disaster risk reduction, school resilience, flood preparedness, and learning continuity in flood-affected educational settings were included in the final review.

Data Extraction, Charting and Collation

Following the study selection process, data were systematically extracted and organised to facilitate a comprehensive synthesis of the literature on Disaster Risk Reduction (DRR), school resilience, flood preparedness, and learning continuity in flood-affected schools. A structured data-charting form was developed to ensure consistency in the extraction and recording of information across all included studies, in line with established evidence synthesis practices.[19]

The data-charting process captured key study characteristics and findings relevant to the review's objectives. The extracted variables included:

- Author(s) and year of publication;
- Country, province, district, or geographical location of the study;
- Research design and methodological approach;
- Study population and sample characteristics;
- Disaster context or hazard focus;
- DRR approaches and resilience strategies examined;
- School infrastructure and preparedness issues identified;

[19] Hilary Arksey and Lisa O'Malley, "Scoping Studies: Towards a Methodological Framework," *International Journal of Social Research Methodology* 8, no. 1 (February 2005): 19–32, https://doi.org/10.1080/1364557032000119616; Areti Angeliki Veroniki et al., "Update to the PRISMA Guidelines for Network Meta-Analyses and Scoping Reviews and Development of Guidelines for Rapid Reviews: A Scoping Review Protocol," *JBI Evidence Synthesis* 23, no. 3 (March 2025): 517–26, https://doi.org/10.11124/JBIES-24-00308.

- Governance, collaboration, and early warning mechanisms reported;
- Learning continuity and educational resilience strategies discussed;
- Key findings and conclusions;
- Recommendations for policy, practice, and future research.

To enhance transparency and facilitate comparison across studies, the extracted data were organised into a study-characteristics matrix (Table 2), which provided a summary of the included literature and its contribution to the review. After data extraction, the collated information was subjected to a thematic synthesis. Initially, all studies were read repeatedly to achieve familiarity with the evidence. Relevant findings were then coded and grouped according to shared concepts and patterns. These codes were subsequently organized into broader categories and synthesized into overarching themes. The analytical process produced three major themes: governance, risk reduction and school resilience; infrastructure vulnerability and preparedness challenges; and educational continuity and school resilience during disruptions. Disaster Resilience Theory guided the development of these themes, with particular attention to the absorptive, adaptive, and transformative capacities of schools in responding to flood-related disruptions. Table 2 summarizes the studies consulted during the review process.

Table 2: Chart of the Selected Studies

No	Authors	Year	Title/Focus	Setting/Location	Research Approach/Design	Population/Sample	Key Findings
1	Van Niekerk	2014	Disaster Management Policy and Institutional Capacity	South Africa	Qualitative policy analysis	Disaster management stakeholders and policy documents	Weak institutional capacity, inadequate funding, and implementation challenges have limited disaster preparedness.
2	Botha et al.	2011	Disaster Risk Management Status Evaluation	South Africa	Evaluation study	Municipal disaster management centres	Limited technical and human resource capacity undermined effective disaster risk reduction implementation.
3	Nethengwe	2007	Participatory GIS and Disaster Risk Planning	South Africa	Literature review	Rural communities and GIS initiatives	Limited spatial information and hazard mapping capacity constrained preparedness planning and risk identification.
4	Holloway and Fortune	2018	Disaster Risk Science and Vulnerability	South Africa	Review study	Disaster-prone communities	Poverty, infrastructure deficits, and environmental exposure increased vulnerability to disasters.
5	Van Niekerk et al.	2020	Disaster Risk Governance	South Africa	Governance review	Disaster management institutions	Weak intergovernmental coordination reduced disaster preparedness effectiveness and weakened resilience efforts.
6	Munzhedzi	2021	Disaster Governance and Local Government Capacity	South Africa	Case study	Municipalities and local governance structures	Poor governance capacity and resource constraints negatively affected disaster management performance.
7	Czerniewicz et al.	2020	Emergency Remote Teaching and Learning	South Africa	Qualitative study	Learners, teachers, and educational institutions	Digital inequalities limited educational continuity during disruptions and emergencies.
8	Spaull	2021	Educational Continuity During COVID-19	South Africa	Educational review	Schools and learners	Low-data technologies and alternative learning modalities supported continuity of learning during disruptions.
9	Jansen and Blank	2020	Schooling During COVID-19 Disruptions	South Africa	Educational review	Schools and teachers	Effective continuity of learning depends on leadership, planning, and institutional preparedness.
10	Mhlongo	2023	School Safety and Preparedness	South Africa	Qualitative study	Rural schools	Most rural schools lack comprehensive disaster preparedness plans and emergency response protocols.

CONCEPTUAL AND THEORETICAL FRAMEWORK

Vhembe School Disaster Resilience Conceptual Model

Figure 2 presents the Vhembe School Disaster Resilience Model, a conceptual framework developed from the thematic synthesis of the 10 South African studies included in this review and informed by Disaster Resilience Theory. The model responds directly to the three themes identified in the findings: governance, risk reduction and school resilience; infrastructure vulnerability and preparedness challenges; and educational continuity and school resilience during disruptions. Rather than representing a prescriptive framework, the model synthesises interconnected resilience factors consistently identified in the reviewed literature as necessary to reduce school vulnerability to recurring flood events in rural settings.



Figure 2: Vhembe School Disaster Resilience Model

Disaster Resilience Theory suggests that resilient institutions develop the capacity to anticipate, absorb, adapt to, and recover from environmental shocks. The findings indicate that schools in the Vhembe District face challenges across these dimensions due to weak hazard identification processes, inadequate infrastructure, fragmented governance structures, and limited continuity-of-

learning systems.[20] In response, the Vhembe School Disaster Resilience Model proposes four interrelated pillars that address these vulnerabilities while aligning with the core principles of Disaster Resilience Theory.

The first pillar, *Risk Anticipation*, emerged from evidence that highlights the importance of hazard mapping, risk assessment, and early warning systems in reducing disaster vulnerability.[21] The reviewed studies revealed that many schools rely on reactive measures due to the absence of systematic risk-identification processes. Therefore, this pillar promotes routine hazard assessments, school-based risk mapping, early warning integration, and clear response protocols.

The second pillar, *Structural Absorption*, is informed by evidence linking flood impacts to poor infrastructure, inadequate drainage systems, and maintenance backlogs.[22] It focuses on climate-resilient infrastructure, including improved drainage, durable building materials, elevated structures, and routine maintenance to minimise physical disruption during flood events.

The third pillar, *Governance and Preparedness*, addresses weaknesses in institutional capacity, emergency planning, and stakeholder coordination.[23] The pillar emphasises the development of capacity of the School Management Team (SMT), regular disaster drills, formal preparedness plans, risk communication systems, and collaboration with disaster management authorities to strengthen schools' adaptive capacity.

The fourth pillar, *Continuity of Learning Adaptation*, is derived from evidence demonstrating the value of low-bandwidth learning approaches during school closures.[24] It promotes the institutionalisation of WhatsApp-based learning, SMS communication, printed learning materials, teacher training, and formal continuity plans to sustain teaching and learning during disruptions.

The novelty of the model lies in its adaptation of Disaster Resilience Theory to the specific context of flood-prone rural schools. Although existing resilience frameworks typically focus on community resilience, disaster management systems, or infrastructure protection, the Vhembe School Disaster Resilience Model integrates governance, infrastructure resilience, preparedness, and continuity of learning within a single school-centered framework. Furthermore, the model explicitly positions school management and educational continuity as central components of resilience, recognising that the ability to sustain teaching and learning during disruptions is as important as the ability to withstand physical disaster impacts. By linking absorptive, adaptive, and transformative capacities to practical school management functions, the model provides a context-specific framework for strengthening resilience in rural educational institutions exposed to recurrent flooding.

Disaster Resilience Theory (DRT)

This study is grounded in Disaster Resilience Theory (DRT), which defines resilience as a system's capacity to resist, absorb, adapt to, transform, and recover from hazardous events while maintaining

[20] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa"; Nicholas Byaruhanga, Daniel Kibirige, and Glen Mkhonta, "Understanding South Africa's Flood Vulnerabilities and Resilience Pathways: A Comprehensive Overview," *Water* 17, no. 17 (September 3, 2025): 2608, https://doi.org/10.3390/w17172608; Nkuna Philile Tiyiselani, Mathonsi Masingita, and Mulovhedzi Shonisani Agnes, "The Impact of Flood Disasters on School Infrastructure and Learning Continuity in Limpopo Province," *International Journal of Innovative Science and Research Technology*, February 9, 2026, 3291, https://doi.org/10.38124/ijisrt/26jan1632.

[21] Tiyiselani, Masingita, and Agnes, "The Impact of Flood Disasters on School Infrastructure and Learning Continuity in Limpopo Province."

[22] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa"; P. H Munzhedzi, " An Evaluation of Disaster Management Systems and Structures in South African Local Government," *Jàmbá: Journal of Disaster Risk Studies* 13, no. 1 (2021): 1–10.

[23] Byaruhanga, Kibirige, and Mkhonta, "Understanding South Africa's Flood Vulnerabilities and Resilience Pathways: A Comprehensive Overview."

[24] Nic Spaull, "COVID-19 and Schooling in South Africa: Who Should Go Back to School First? N. Spaull," *Prospects* 51, no. 4 (2022): 563–72; Moleboheng Ramulumo and Soane Mohapi, "Utilizing Blended Learning to Mitigate the Challenges Brought by Natural Disasters in South African Schools," *Research in Social Sciences and Technology* 8, no. 4 (November 1, 2023): 76–93, https://doi.org/10.46303/ressat.2023.33; Tiyiselani, Masingita, and Agnes, "The Impact of Flood Disasters on School Infrastructure and Learning Continuity in Limpopo Province."

essential functions such as safe access and continuity of learning.[25] In flood-prone schooling contexts, DRT shifts attention from isolated disaster events to the institutional capabilities developed in preparedness, response, and recovery. This perspective is particularly relevant to the Vhembe District, where intense rainfall, vulnerable infrastructure, and socio-economic challenges combine to heighten disaster risk.[26] As such, DRT provides a systems-oriented lens that emphasises institutional capacity, coordinated governance, and sustained educational continuity.[27]

Four interconnected strands of scholarship informed the application of DRT to schooling. First, studies show that floods disrupt education through infrastructure damage, inaccessible transport routes, limited preparedness, and learning interruptions, while also identifying indicators to assess school resilience.[28] Second, disability-inclusive DRR research highlights accessibility, participation, non-discrimination, collaboration, and inclusive planning as core features of resilient schools.[29] Third, studies on community-based disaster education demonstrate that teacher well-being and professional resilience contribute significantly to school and community preparedness. [30] A South African governance study reveals uneven integration of DRR within education systems and broader challenges in translating policy into practice.

The framework operationalises DRT through three resilience capacities: absorptive, adaptive, and transformative. Absorptive capacity is reflected in hazard assessments, role clarity, evacuation drills, and basic systems that allow schools to continue operating during floods. Adaptive capacity refers to the ability to adjust through impact-based early warnings, climate-smart infrastructure improvements, communication systems, and continuity-of-learning strategies suited to local conditions. Transformative capacity focuses on long-term institutional change through dedicated DRR budgets, emergency procurement procedures, formal partnerships with disaster management agencies, and inclusive policies embedded within school governance structures.[31]

The framework also highlights important knowledge gaps. Limited evidence exists on how early warning information is translated into school-level standard operating procedures, while research on DRR budgeting, emergency procurement, and the institutionalisation of inclusive DRR practices remains sparse.[32] Similarly, school-centred assessments of flood resilience in rural Limpopo remain limited despite evidence of high vulnerability.[33] By providing common concepts and indicators, DRT enables systematic comparison across schools and studies and offers a coherent framework for analysing resilience-building efforts in flood-affected educational settings.[34]

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[25] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)."

[26] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa"; Tlou D. Raphela and N. Ekeke, "Resilience and the Dissemination of Flood Disaster Early Warning Messages in a Township in South Africa," *Frontiers in Communication* 10 (July 2, 2025), https://doi.org/10.3389/fcomm.2025.1503016; Lunga et al., "Critical Zones, Disaster Risk Science, and Education for Sustainable Development in Africa."

[27] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)."

[28] Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review"; Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. ."

[29] Rofiah, Kawai, and Hayati, "Disability-Inclusive Disaster Risk Reduction in Schools: A Confirmatory Factor Analysis."

[30] Qingchen Fu and Xing Zhang, "Promoting Community Resilience through Disaster Education: Review of Community-Based Interventions with a Focus on Teacher Resilience and Well-Being," *PLOS ONE* 19, no. 1 (January 2, 2024): e0296393, https://doi.org/10.1371/journal.pone.0296393.

[31] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)"; L Banham and E Papakosta, "Disability and Inclusive Education; A Stock Take of Education Sector Plans and GPE-Funded Grants," *Global Partnership for Education, Washington, DC, USA. Available At*, 2018; Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review"; Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. "; Rofiah, Kawai, and Hayati, "Disability-Inclusive Disaster Risk Reduction in Schools: A Confirmatory Factor Analysis."

[32] Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review."

[33] Munyai et al., "Vulnerability and Adaptation to Flood Hazards in Rural Settlements of Limpopo Province, South Africa"; Raphela and Ekeke, "Resilience and the Dissemination of Flood Disaster Early Warning Messages in a Township in South Africa."

[34] United Nations Office for Disaster Risk Reduction, " Resilience (Sendai Framework Terminology on Disaster Risk Reduction)"; Banham and Papakosta, "Disability and Inclusive Education; A Stock Take of Education Sector Plans and GPE-Funded Grants"; Pal et al., "Assessment of Vulnerability and Resilience of School Education to Climate-Induced Hazards: A Review"; Williams, "The Impact of Disaster on Education: Understanding Loss and Pathways to Recovery. ."

The Vhembe School Disaster Resilience Model and Disaster Resilience Theory provide a coherent analytical lens for understanding how flood-prone schools can strengthen their resilience through interconnected institutional, infrastructural, governance, and pedagogical interventions. By linking the concepts of absorptive, adaptive, and transformative capacity with practical school management functions, the framework offers both a theoretical foundation and a context-sensitive structure to analyse resilience gaps and identify strategies that support preparedness, response, recovery, and continuity of learning in flood-affected rural schools.

LITERATURE REVIEW

After applying the inclusion and exclusion criteria, 10 South African studies published between 2014 and 2023 were included in this review. Collectively, the literature demonstrates that disaster risk reduction (DRR) and resilience-building are influenced by governance capacity, infrastructure conditions, and the ability of institutions to sustain essential functions during crises. Although the reviewed studies acknowledge the existence of legislative and policy frameworks intended to strengthen preparedness and resilience, they consistently point to implementation challenges that limit their effectiveness. Rather than presenting resilience as a purely technical issue, the literature suggests that the interaction of institutional, infrastructural, and socioeconomic factors shapes resilience outcomes. Three key themes emerged from the review: governance, risk reduction and school resilience; infrastructure vulnerability and preparedness challenges; and educational continuity and school resilience during disruptions. Together, these themes highlight the multidimensional nature of resilience and the factors that influence preparedness, response, and recovery in vulnerable contexts.

Theme 1: Governance, Risk Reduction and School Resilience

The reviewed studies consistently suggest that the effectiveness of DRR initiatives in South Africa is less influenced by the existence of policy frameworks than by the capacity of institutions to implement them. Although legislative and policy provisions promote preparedness and resilience, their practical application remains uneven. This indicates that the central challenge lies not in policy development but in the institutional conditions required for successful implementation.

A recurring pattern in the literature is the relationship between governance capacity and disaster preparedness. Van Niekerk identified inadequate funding, limited technical expertise, and implementation challenges as barriers to effective preparedness,[35] while Botha et al. similarly highlighted shortages of human and technical resources within municipal disaster management structures.[36] Together, these studies suggest that institutional capacity constraints represent systemic rather than isolated challenges, limiting the ability of organisations to implement risk reduction measures effectively.

The literature further indicates that resource constraints alone do not adequately explain weaknesses in disaster preparedness. Van Niekerk et al. and Munzhedzi emphasise the significance of weak coordination and governance failures in undermining disaster management effectiveness.[37] Together, these findings point to the importance of institutional coherence and collaboration in resilience-building efforts. In this sense, preparedness appears to depend not only on available resources but also on the ability of institutions to coordinate actions, share responsibilities, and align disaster management objectives across multiple levels of governance.

The studies also highlight the importance of risk identification as a component of preparedness. Nethengwe found that limitations in spatial information systems and hazard mapping constrained

[35] P Reid and D Van Niekerk, "A Reflective Review of Disaster Risk Reduction in South Africa," *Jàmbá: Journal of Disaster Risk Studies* 1, no. 1 (2008): 1–9.
[36] D Botha et al., "Disaster Risk Management Status Evaluation in South Africa ," *Jàmbá: Journal of Disaster Risk Studies* 3, no. 2 (2011): 313–22.
[37] Reid and Van Niekerk, "A Reflective Review of Disaster Risk Reduction in South Africa"; Munzhedzi, " An Evaluation of Disaster Management Systems and Structures in South African Local Government."

effective preparedness planning, particularly within rural settings.[38] This suggests that preparedness deficiencies are not solely operational but also informational, as institutions may lack the knowledge necessary to identify vulnerabilities and develop preventative strategies. As a result, disaster management interventions often remain reactive rather than proactive.

Overall, the literature demonstrates that governance challenges, limited institutional capacity, poor coordination, and inadequate risk assessment reinforce one another. Collectively, these factors hinder the implementation of DRR initiatives and reduce institutional readiness to effectively manage disaster risks.

Theme 2: Infrastructure Vulnerability and Preparedness Challenges

The reviewed studies identify infrastructure vulnerability as a critical factor shaping disaster risk and resilience outcomes. However, the literature suggests that infrastructure should not be viewed in isolation, as its influence is closely linked to broader socioeconomic and institutional conditions. Vulnerability arises from the interaction between physical exposure, resource limitations, and preparedness capacity, rather than from infrastructure deficits alone.

Holloway and Fortune argue that poverty, environmental exposure, and inadequate infrastructure significantly increase vulnerability within disaster-prone communities. Their findings indicate that the existing social and economic inequalities often amplify impacts of disaster.[39] This suggests that the consequences of disasters are shaped not only by the intensity of hazard events but also by the conditions that exist before disasters occur. Consequently, resilience-building requires attention to underlying vulnerabilities that increase susceptibility to disaster impacts.

The literature also points to the importance of information and planning systems in reducing vulnerability. Nethengwe demonstrates that inadequate access to spatial information and hazard mapping constrains preparedness and risk reduction efforts. [40] This finding highlights the interdependence between infrastructure and knowledge systems, suggesting that physical investments alone are insufficient when not supported by accurate risk information. The challenge is particularly pronounced in rural areas, where technical capacity and access to specialised planning resources are often limited.

Evidence from Van Niekerk, Botha et al., and Munzhedzi further suggests that preparedness challenges are closely linked to institutional weaknesses. [41] Resource limitations, governance constraints, and implementation deficits reduce the effectiveness of interventions designed to address vulnerability. The consistency of these findings across studies indicates that infrastructure resilience is inseparable from institutional capacity.

Taken together, the literature demonstrates that vulnerability is multidimensional and is shaped by physical and organisational factors. Infrastructure deficits, environmental exposure, governance weaknesses, and limited preparedness capacity work collectively to increase disaster risk. Therefore, evidence suggests that resilience-building initiatives require integrated approaches that address both the infrastructural and institutional dimensions of vulnerability.

Theme 3: Educational Continuity and School Resilience During Disruptions

The reviewed literature demonstrates that resilience within educational settings extends beyond physical preparedness. It includes the capacity of schools to sustain teaching and learning during disruptions. Educational continuity emerges as a central component of resilience, particularly in

[38] Nthaduleni S Nethengwe, *Integrating Participatory GIS and Political Ecology to Study Flood Vulnerability in the Limpopo Province of South Africa* (West Virginia University, 2007).

[39] A Holloway and G Fortune, *Disaster Risk Science in South Africa* (Springer., 2018), https://www.ndmc.gov.za/Home/DRRSchoolKit.

[40] Nethengwe, *Integrating Participatory GIS and Political Ecology to Study Flood Vulnerability in the Limpopo Province of South Africa*.

[41] Dewald van Niekerk, "A Critical Analysis of the South African Disaster Management Act and Policy Framework," *Disasters* 38, no. 4 (October 5, 2014): 858–77, https://doi.org/10.1111/disa.12081; Botha et al., "Disaster Risk Management Status Evaluation in South Africa "; Munzhedzi, " An Evaluation of Disaster Management Systems and Structures in South African Local Government."

contexts where disasters frequently interrupt normal schooling activities. Collectively, studies indicate that the effectiveness of continuity mechanisms is influenced by technological access, institutional preparedness, and leadership capacity.

A prominent issue emerging from the literature is the role of digital inequality in shaping educational resilience. Czerniewicz et al. found that unequal access to digital infrastructure significantly limited participation in teaching and learning during periods of disruption.[42] Although digital learning is often presented as a solution to maintaining educational continuity, the findings suggest that its effectiveness depends on equitable access to supporting resources. Consequently, digital technologies may simultaneously strengthen resilience for some learners while reinforcing existing inequalities for others.

The literature also challenges assumptions that educational resilience depends exclusively on sophisticated technological systems. Spaull found that low-data technologies and alternative learning modalities effectively sustained learning during disruptions.[43] This suggests that resilience is strengthened not necessarily through technological sophistication but through solutions responsive to local circumstances and resource constraints. The effectiveness of continuity strategies therefore appears to depend on their accessibility and contextual relevance.

Institutional preparedness emerges as another significant determinant of educational continuity. Jansen and Blank emphasise the importance of strategic leadership, proactive planning, and organisational readiness to sustain learning during emergencies. Their findings imply that resilience is not only a product of available resources but also of institutional capacity to anticipate and manage disruptions.[44] Schools with established preparedness mechanisms appear better positioned to minimise learning losses and maintain educational activities during crises.

However, evidence presented by Mhlongo indicates that many rural schools continue to lack comprehensive preparedness plans, emergency procedures, and structured resilience-building programmes.[45] This suggests a gap between recognised preparedness requirements and actual school-level practices. The persistence of this gap raises concerns about vulnerable schools' ability to cope effectively with future disruptions.

DISCUSSION

The findings suggest that the principal challenge confronting disaster preparedness and resilience in South African schools is not the absence of Disaster Risk Reduction (DRR) policies, but the inability of institutions to translate these policies into effective practice. Viewed through the lens of Disaster Resilience Theory (DRT), resilience is not merely a function of policy existence but of institutional capacities that enable organisations to anticipate, absorb, adapt to, and recover from disruptions. The reviewed literature, therefore, highlights a critical distinction between formal policy frameworks and the operational conditions necessary to achieve resilience. This finding extends the DRT by demonstrating that resilience within school environments is highly dependent on institutional implementation capacity and functionality rather than policy availability alone.

A key insight emerging from the review concerns the central role of governance in shaping resilience outcomes. Studies collectively reveal that inadequate funding, weak intergovernmental coordination, limited technical expertise, and resource constraints undermine preparedness efforts.[46]

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[42] Laura Czerniewicz et al., "A Wake-up Call: Equity, Inequality and Covid-19 Emergency Remote Teaching and Learning," *Postdigital Science and Education* 2, no. 3 (2020): 946–67.

[43] Spaull, "COVID-19 and Schooling in South Africa: Who Should Go Back to School First? N. Spaull."

[44] J. D Jansen and G Blank, "Learning under Lockdown: The Educational Implications of the COVID-19 Pandemic in South Africa." (South African educational scholarship, 2020).

[45] T Mhlongo, "School Safety and Disaster Preparedness in Rural South African Schools. ," *South African Journal of Education* 43, no. Special Issue (2023): 1–12.

[46] van Niekerk, "A Critical Analysis of the South African Disaster Management Act and Policy Framework"; Botha et al., "Disaster Risk Management Status Evaluation in South Africa "; Floretta Boonzaier, Monique Huysamen, and Taryn van Niekerk, "Men from the South," *Men, Masculinities and Intimate Partner Violence*, 2020, 52; Munzhedzi, " An Evaluation of Disaster Management Systems and Structures in South African Local Government."

Rather than viewing governance as a contextual factor, the findings position it as a foundational resilience mechanism. The analysis suggests that governance capacity directly influences how effectively schools mobilise resources, coordinate stakeholders, and implement risk-reduction measures. Consequently, the findings extend DRT by demonstrating that governance processes shape adaptive capacity in educational institutions. Where governance systems are fragmented, resilience capacities remain constrained regardless of the existence of formal DRR policies.

The findings further indicate that risk identification and preparedness planning are fundamental drivers of resilience. Nethengwe found that inadequate hazard mapping and limited spatial information systems constrained preparedness planning, particularly in vulnerable rural communities.[47] From a DRT perspective, the significance of this finding lies not only in the absence of technical information but also in how such limitations weaken anticipatory action. The inability to identify risks before disasters occur restricts the development of absorptive capacity and increases institutional dependence on reactive disaster responses. This suggests that resilience is strengthened through knowledge-based preparedness systems that enable proactive decision-making. The findings therefore broaden DRT by emphasising risk intelligence as a critical component of institutional resilience within school settings.

Infrastructure vulnerability emerged as another significant determinant of resilience. Holloway and Fortune demonstrated that poverty, environmental exposure, and infrastructure deficits increase vulnerability in disaster-prone communities.[48] While DRT acknowledges the importance of physical systems in supporting resilience, the findings indicate that educational institutions experience infrastructure challenges differently because infrastructure directly affects both safety and the continuity of teaching and learning. In this context, infrastructure serves not only a protective function but also an educational function. The findings therefore contribute to DRT by showing that resilience in schools cannot be separated from the ability of physical environments to sustain educational activities during and after disruptive events.

The review further demonstrates that vulnerability stems from the interaction of institutional and infrastructural weaknesses rather than through any single factor. Evidence shows that inadequate planning, governance weaknesses, resource shortages, and implementation challenges reinforce infrastructure vulnerabilities and reduce preparedness.[49] This finding highlights the interconnected nature of resilience capacities. From a DRT perspective, absorptive and adaptive capacities do not operate independently but are mutually dependent. As a result, resilience cannot be achieved through infrastructure improvements alone or through governance reforms in isolation. The analysis therefore extends DRT by demonstrating the need for integrated resilience systems in which institutional and physical capacities function together to reduce vulnerability.

Educational continuity emerged as a particularly important dimension of resilience. Czerniewicz et al. found that digital inequalities limited learners' participation in educational activities during periods of disruption, especially in disadvantaged and rural communities.[50] This finding suggests that resilience in educational settings involves more than protecting buildings and infrastructure. It also requires the capacity to sustain core educational functions despite disruption. From a DRT perspective, continuity of learning represents a form of adaptive capacity that enables schools to maintain their primary purpose under adverse conditions. The findings therefore expand the application of DRT by identifying educational continuity as a distinct indicator of institutional resilience.

At the same time, the findings challenge assumptions that resilience depends exclusively on advanced technological solutions. Spaull found that low-data technologies and alternative learning

[47] Nethengwe, *Integrating Participatory GIS and Political Ecology to Study Flood Vulnerability in the Limpopo Province of South Africa*.
[48] Holloway and Fortune, *Disaster Risk Science in South Africa*.
[49] van Niekerk, "A Critical Analysis of the South African Disaster Management Act and Policy Framework"; Botha et al., "Disaster Risk Management Status Evaluation in South Africa "; Munzhedzi, " An Evaluation of Disaster Management Systems and Structures in South African Local Government."
[50] Czerniewicz et al., "A Wake-up Call: Equity, Inequality and Covid-19 Emergency Remote Teaching and Learning."

modalities supported continuity of learning during disruptions.[51] Analytically, this suggests that resilience is influenced less by technological sophistication than by contextual appropriateness. Schools are better able to adapt when solutions align with local realities and available resources. This observation extends DRT by highlighting that adaptive capacity is context-dependent and can emerge through flexible, accessible, and locally relevant strategies rather than through resource-intensive interventions alone.

The review also underscores the importance of institutional preparedness in sustaining educational resilience. Jansen and Blank found that continuity of learning depends on proactive leadership, strategic planning, and organisational preparedness,[52] while Mhlongo reported that many rural schools lacked comprehensive preparedness plans and emergency procedures.[53] These findings suggest that preparedness is not simply a response mechanism but a process through which institutions build long-term resilience. From a DRT perspective, preparedness contributes to transformative capacity because it supports organisational learning and enables institutions to improve future responses to disruption. The findings therefore extend DRT by demonstrating how leadership and school management practices institutionalise resilience capacities over time.

Overall, the reviewed literature indicates that resilience in South African schools is shaped by the interaction of governance capacity, risk assessment systems, infrastructure resilience, preparedness planning, and continuity-of-learning mechanisms. More importantly, the findings extend Disaster Resilience Theory by demonstrating that resilience within educational institutions encompasses both the protection of physical assets and the maintenance of educational functions. The analysis further reveals that absorptive, adaptive, and transformative capacities are interconnected and collectively influenced by school management practices. School leadership, governance, preparedness planning, and continuity-of-learning strategies, therefore, emerge as central mechanisms through which resilience is developed and sustained. Therefore, strengthening resilience in flood-prone schools requires integrated interventions that simultaneously address institutional effectiveness, infrastructure development, risk assessment, and educational continuity, thereby improving schools' ability to anticipate, withstand, adapt to, and recover from future disruptions.

RECOMMENDATIONS

Based on the findings of this review, several targeted recommendations can be made to strengthen disaster resilience and continuity of learning in flood-affected schools in the Vhembe District. First, schools should institutionalise risk anticipation practices, including routine hazard mapping, regular risk assessments, and the incorporation of early warning information into school communication and decision-making systems. These measures would enable School Management Teams (SMTs) to identify potential threats proactively and implement timely preparedness actions. Second, the Department of Basic Education and local municipalities should prioritise resilient infrastructure development, particularly improved drainage systems, climate-responsive school facilities, and accessible transport routes, as infrastructure vulnerabilities remain a significant contributor to educational disruptions.

Third, it is essential to strengthen governance and preparedness through structured DRR capacity-development programmes for SMTs, regular emergency drills, and clear procedures for coordinating with disaster management authorities. This would address the institutional and leadership weaknesses identified in the review and promote more proactive disaster management practices. Fourth, schools should formalise continuity-of-learning mechanisms by developing school-based plans that support flexible low-data learning approaches, teacher preparedness, and access to alternative learning resources. Such measures can sustain teaching and learning during periods of disruption and minimise instructional losses.

[51] Spaull, "COVID-19 and Schooling in South Africa: Who Should Go Back to School First? N. Spaull."
[52] Jansen and Blank, "Learning under Lockdown: The Educational Implications of the COVID-19 Pandemic in South Africa."
[53] Mhlongo, "School Safety and Disaster Preparedness in Rural South African Schools. ."

Finally, national and provincial education authorities must ensure that school-based disaster resilience initiatives are aligned with existing policy frameworks, adequately resourced, and supported through collaborative partnerships with relevant stakeholders. Continued collaboration between policymakers, educators, researchers and disaster management practitioners will be essential to strengthen resilience and monitor the effectiveness of school-based disaster risk reduction interventions. Collectively, these recommendations provide a pathway for building more resilient, prepared, and learning-sustaining schools in flood-prone rural communities such as Vhembe.

CONCLUSION

Persistent challenges such as weak governance structures, inadequate risk assessment systems, infrastructure vulnerabilities, and limited preparedness continue to undermine schools' ability to anticipate, withstand, and recover from flood-related disruptions in the Vhembe District. The findings demonstrate that effective disaster risk reduction requires integrated and context-sensitive strategies that address governance, infrastructure resilience, and continuity of learning simultaneously. The review further shows that schools require practical resilience-building measures, including improved risk identification processes, strengthened institutional capacity, resilient infrastructure, and accessible continuity-of-learning mechanisms to minimise the educational consequences of recurrent flooding.

By synthesising evidence from South African literature through the lens of Disaster Resilience Theory, this review contributes to scholarship by advancing understanding of the governance, infrastructural, institutional, and educational factors that influence resilience in disaster-prone schools. The study further extends the application of Disaster Resilience Theory to school management and proposes the Vhembe School Disaster Resilience Model as a context-specific framework for improving preparedness, resilience, and continuity of learning.

IMPLICATIONS FOR POLICY

The findings highlight the need for stronger integration of disaster risk reduction within school governance, infrastructure planning, and educational continuity systems. Policymakers should prioritise investment in risk assessment processes, climate-resilient infrastructure, preparedness planning, and capacity development for School Management Teams (SMTs). Strengthened collaboration among schools, disaster management authorities, policymakers, and local communities is also essential to improve resilience in flood-prone rural settings.

IMPLICATIONS FOR FUTURE RESEARCH

Future research should focus on empirically testing and refining the Vhembe School Disaster Resilience Model in flood-prone schools and similar rural contexts. Further studies could also explore the long-term effectiveness of continuity-of-learning mechanisms, school leadership practices, and governance interventions in strengthening resilience. Such research would contribute to the continued development of Disaster Resilience Theory within educational settings and strengthen the evidence base for resilience-focused school management and planning.

CONFLICT OF INTEREST

The authors confirm that there are no competing interests associated with this study.

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ABOUT AUTHOR

Dr Aubrey Mokwebo is a lecturer at the University of Venda (UNIVEN) with a strong academic background that includes a PhD, MEd, BEd (EM), PGDL, PGCE, and BCom (Economics). His research interests are centered on educational leadership and management, school governance, quality assurance, educational finance, higher education, and the integration of emerging technologies in education. He has contributed to scholarly work on school financial management, education policy, student success, and community participation in education, with a particular focus on addressing challenges and advancing educational quality in South Africa. As an academic and researcher, Dr Mokwebo is committed to producing evidence-based knowledge that informs policy and practice, promotes equitable access to education, and supports sustainable educational development in diverse contexts. He actively engages in research, teaching, supervision, and academic service, striving to enhance educational outcomes and contribute to the transformation of the education sector.