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School Strategies for Flood-Prone Primary Schools in the Districts of Bendahara and Banda Mulia in Aceh Tamiang Regency

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ABSTRACT

This study examines the strategic management strategies utilized by primary schools in flood-prone regions in Aceh Tamiang Regency, Indonesia. The study seeks to investigate how educational leaders devise, execute, and assess management measures to maintain learning continuity during persistent flooding events. A qualitative case study methodology was utilized to gather data via in-depth interviews, direct observations, and document analysis at two public elementary schools located in the Bendahara and Banda Mulia Districts. Data were examined with NVivo 12 software to discern prevailing themes and managerial trends. The results indicate that school resilience is cultivated through three interconnected strategic elements: proactive planning, adaptive implementation, and reflective evaluation. Proactive planning emphasizes risk identification, the incorporation of flood mitigation strategies into educational policies, and preparedness training for educators and students. Adaptive implementation prioritizes flexible learning structures, community collaboration, and the use of local resources during floods. Reflective evaluation encompasses participatory dialogues, peer assessments, and continuous enhancement to bolster institutional preparedness. The study indicates that efficient disaster-responsive school management necessitates visionary leadership, collaborative planning, and robust community engagement. The findings enhance the theoretical discussion on resilient educational management by illustrating how context-specific techniques might support teaching and learning in disaster-prone areas.

1. Introduction

Education is fundamental to national development and is essential in developing resilient and sustainable societies(Benavot et al., 2024). The continued operation of education is significantly reliant on the stability of the social and physical milieu in which it transpires(Intaramuean et al., 2024). In disaster-prone nations like Indonesia, schools serve as not just sites of formal education but also as community hubs for safety, protection, and resilience enhancement(Mfon, 2024). Consequently, the creation of school management systems that address catastrophe risks has become a vital element of the national education agenda(Wibowo et al., 2024). Indonesia, an archipelagic nation situated in the tropical zone, endures substantial rainfall year-round and is among

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the most disaster-prone countries globally. Floods constitute one of the five most prevalent natural catastrophes impacting Indonesia(Hizbaron et al., 2021).

Indonesia, as an archipelagic nation situated in the tropical zone, is consistently susceptible to numerous natural disasters such as floods, earthquakes, volcanic eruptions, and tsunamis(Teh & Khan, 2021). Floods are among the most frequent and destructive events, impacting millions of individuals each year and interrupting educational activities across several regions(Dwijayanti et al., 2024). The Indonesian government has progressively prioritized the incorporation of disaster risk reduction (DRR) techniques within the national education framework(Sufri et al., 2025). The establishment of school-based crisis management systems, encompassing preparedness, response, and recovery strategies, has emerged as a vital policy goal to guarantee the resilience and continuity of educational services during crises(Wallengren-Lynch, 2025).

Periodic floods in Indonesia have caused significant financial and non-financial losses, profoundly impacting economic productivity, social stability, and the educational sector(Lassa et al., 2023). Flood catastrophes not only devastate essential infrastructure, including classrooms, educational resources, and sanitation facilities, but also relocate students and instructors, resulting in considerable disruptions to learning(Christantyawati et al., 2023). Educational institutions situated in flood-prone regions are particularly susceptible, frequently compelled to halt operations for prolonged durations while confronting increased threats to the physical safety and psychological welfare of students and staff(Mukaroma et al., 2022). These disruptions highlight the critical necessity for comprehensive, flexible, and context-sensitive school management frameworks that can effectively alleviate disaster consequences and guarantee educational continuity during emergencies(Wachidatullailiya et al., 2025).

The concept of disaster-resilient schools has emerged as a critical educational and policy priority worldwide, highlighting the importance of preparedness, mitigation, and adaptive governance to protect learning processes during disasters(Shah et al., 2020). The framework advocates for a cohesive strategy that includes secure school infrastructure, efficient disaster education, and community involvement(Osegbue, 2025). In this framework, school principals assume a crucial leadership position; they function as administrators, strategic managers, and community mobilizers, tasked with balancing organizational, logistical, and human resource problems during crises. Effective leadership promotes proactive disaster preparedness strategies, orchestrates emergency responses, and involves stakeholders—such as educators, parents, and local authorities—to develop a resilient educational environment(Ayu et al., 2022).

In Aceh Tamiang Regency, floods have become a perennial phenomenon due to the area's low-lying topography and insufficient drainage systems(Azizah et al., 2022). Elementary schools in districts like Bendahara and Banda Mulia are often flooded, resulting in extended class postponements, the destruction of essential educational records, and psychological suffering for both teachers and students. Notwithstanding these persistent issues, limited study has concentrated on how school leaders formulate and execute effective management strategies to address disaster risks(Hasbi et al., 2023). Current research in Indonesia has primarily focused on technical flood mitigation and community engagement, whereas strategic educational leadership in crisis scenarios is less explored.

This study aims to investigate how school principals at flood-prone primary schools in Aceh Tamiang develop, execute, and assess strategic management approaches to ensure educational continuity during and after flooding occurrences. The study examines three interconnected components of educational strategy: (1) the development of strategic plans, (2) the execution of adaptive educational programs, and (3) the assessment of management efficacy in sustaining school resilience.

This research advances both theoretical and practical domains. It theoretically enhances the literature on educational disaster management by including leadership, strategy, and risk management into a comprehensive school-based framework. It provides pragmatic ideas for policymakers, school administrators, and education practitioners on formulating robust school management models that protect learning in disaster-impacted areas. This study presents solutions that integrate visionary leadership, community engagement, and reflective assessment, positioning schools as not only educational institutions but also as foundational elements of community resilience, fostering adaptive, innovative, and disaster-conscious generations.

2. Methodology

2.1 Research Design

This research employs a qualitative methodology utilizing a case study approach(Gioia, 2021). Qualitative research methods are employed to examine the inherent conditions of objects, wherein researchers serve as primary instruments, data collection techniques utilize triangulation, data analysis is conducted inductively, and qualitative research findings prioritize meaning over generalization.

2.2 Research Setting and Participants

The research was conducted at SD Negeri Tanjung Mulia (Bendahara District) and SD Negeri Paya Rahat (Banda Mulia District), both categorized as flood-prone. Participants consisted of eight informants, including two principals, two subject teachers, two classroom teachers, and two administrative staff. Participants were selected through purposive sampling, ensuring relevant experience in school management under disaster conditions.

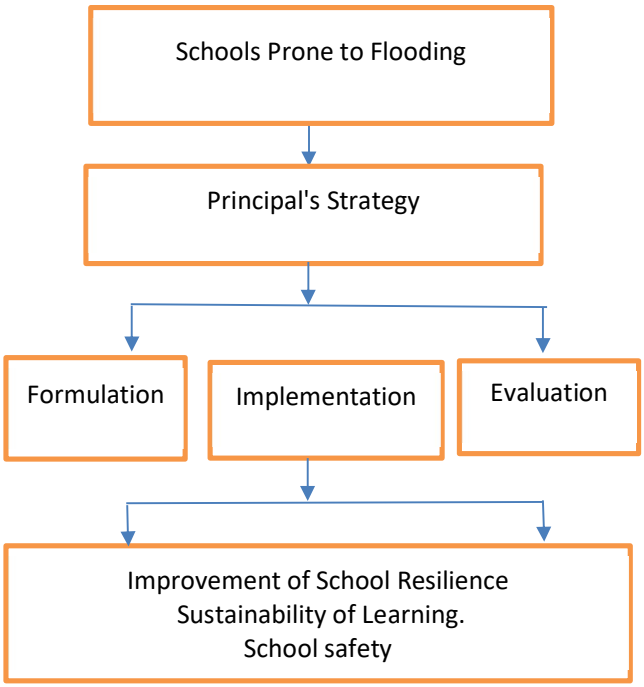

Figure. 1 conceptual framework

2.3 Data Collection

Data were obtained through semi-structured interviews, direct observations, and document analysis. Interviews explored planning, resource management, and adaptive strategies; observations documented school conditions and leadership practices; and document reviews verified institutional records such as work plans and meeting minutes. Triangulation across these sources enhanced data validity.

2.4 Data Analysis

The data collected through interviews, observations, and document analysis were examined using the Miles and Huberman (1994) interactive model, which involves three concurrent stages: data reduction, data display, and conclusion drawing/verification. In the data reduction stage, all raw data were carefully reviewed, coded, and categorized to identify patterns relevant to the research objectives, while irrelevant information was discarded. The reduced data were then organized and displayed descriptively through narrative summaries, matrices, and visual diagrams generated using NVivo 12 software(Alam, 2021). This process facilitated the identification of thematic connections among leadership strategies, school management processes, and adaptive practices during flood events. In the final stage, the researcher drew conclusions by synthesizing recurring themes and patterns that reflected the principals' strategic approaches in planning, implementation, and evaluation. To ensure accuracy and credibility, findings were verified through triangulation across data sources and member checking with participants. This iterative and reflective process allowed for a holistic interpretation of the school management strategies employed in flood-prone contexts, emphasizing the interplay between leadership, preparedness, and institutional resilience.

3. Results

The study's findings reveal that the efficacy of schools in managing floods is significantly influenced by three essential managerial elements: 1. Proactive planning, which involves risk anticipation and the incorporation of mitigation strategies into school policies.2. Adaptive implementation facilitates ongoing learning by providing flexibility in spatial arrangements and instructional methodologies. 3. Reflective review is employed to ascertain strengths and weaknesses, enabling the refinement of methods for future events.

The three components constitute an ongoing strategic cycle, as articulated by Bryson (2018) in his theory of Strategic Management in Public Organizations. Moreover, these findings substantiate the Resilient Education Management theory (Shaw, 2021), which posits that resilient schools are assessed not solely by the structural integrity of their facilities, but also by the capacity of educational stakeholders (principals, teachers, committees) to adapt to environmental changes through collaboration and innovation.

3.1 School Strategic Planning in Response to Flooding.

Planning constitutes the preliminary phase in strategic school management to guarantee the continuance of the educational process amid floods. Research conducted at Paya Rahat Public Elementary School and Tanjung Mulia Public Elementary School indicates that the planning phase involves flood risk assessment, infrastructure organization, emergency curriculum formulation, and enhancement of collaborations with the community and local government.

The principal is pivotal in implementing these mitigation measures. According to KS-PR: "We convene meetings with educators and the school committee in preparation for the impending rainy season." We have also identified the rooms that can be utilized in the event of water ingress.

These findings validate Mulyasa's (2020) assertion that the principal operates as an educational manager responsible for guiding and preempting possible crises through methodical and pragmatic planning. The educational disaster mitigation planning executed in both schools aligns with the Education in Emergency framework (INEE, 2018), which underscores the necessity of contingency plans to maintain the continuity of teaching and learning during emergencies.

Furthermore, the devised plan embodies participatory ideas. teachers, school committees, and the community participated in formulating the strategy. This cooperative collaboration exemplifies the concept of School-Based Management, positioning the principal as the primary catalyst, supported collectively by the school community (Bush, 2020). Consequently, the planning phase at flood-prone educational institutions has demonstrated the use of participatory management and advanced risk anticipation.

3.2 *Implementation of Learning Strategies in Schools prone to Flooding.*

The implementation of strategies in both schools emphasized the continued progress of learning despite the disruption of physical facilities due to flooding. The employed tactics encompassed relocating educational events to secure venues (prayer rooms, residences, or community posts), executing autonomous task-oriented learning via Student Worksheets (LKS), and fostering extensive communication with parents through social media platforms.

Teachers actively facilitated the continuation of learning.

According to G-PR: "*When the water levels increased, we promptly relocated our educational activities to the prayer room or to elevated terrain*. *We persisted in assigning tasks to the students to facilitate their learning despite their absence from school*".

This implementation demonstrates an adaptable approach to emergency learning adaption, consistent with the tenets of adaptive management (Mintzberg, 2017), allowing for program execution to be modified according to environmental conditions. This technique aligns with Raharjo's (2022) research, which indicates that the success of schools in disaster-affected regions is mostly contingent upon the capacity of educators and administrators to develop contextual and effective alternative learning systems.

Alongside flexibility, the execution of the approach prioritizes psychosocial support for students. Educators endeavor to inspire and sustain children's passion for learning to prevent feelings of trauma or a decline in interest due to adverse events. This supports Fullan's (2019) argument of the moral imperative of leadership, asserting that educational leadership during crises should prioritize the welfare and sustainability of student learning over basic academic objectives.

3.3 *Evaluation of Strategies for Flood-Prone Schools.*

The assessment phase was conducted post-flood receding through introspective dialogue among the principal, educators, and school committee. The assessment encompassed the efficacy of learning methodologies, the effectiveness of parental communication, and the preparedness of emergency facilities and infrastructure.

KS-TM stated: *"Following the flood, we consistently conduct a joint evaluation. We examine ineffective aspects, particularly coordination and the preparedness of instructional materials."*

This assessment method embodies the supervisory role in educational management as articulated by Terry (2019), indicating that evaluation serves to ensure activities adhere to the established plan and to identify potential enhancements for the future. In both institutions, the

assessment outcomes were used to enhance evacuation standard operating procedures, revise the inventory of alternative learning sites, and bolster educators' preparedness in facilitating autonomous learning. This indicates that school evaluation transcends basic administration, functioning as a dynamic process of organizational learning that evolves from practical experience.

4. Conclusions

This study demonstrates that school management in flood-prone regions of Aceh Tamiang Regency functions through a cohesive cycle of proactive planning, adaptive execution, and reflective assessment, which jointly ensure the continuity of learning throughout recurrent flood occurrences. The principals in the studied schools do not solely act as administrative managers; instead, they undertake strategic leadership responsibilities that foresee hazards, mobilize resources, and coordinate both internal and external stakeholders. Proactive planning allows schools to recognize weaknesses, integrate disaster mitigation strategies into institutional policy, and equip educators and students through organized readiness initiatives. In the event of flooding, adaptive implementation guarantees the persistence of education through versatile teaching methods, the relocation of educational environments, and robust contact with parents and community stakeholders. Reflective evaluation enhances institutional resilience by converting catastrophe experiences into managerial enhancements, thereby improving emergency curricula, infrastructure preparedness, and communication systems.

The findings support current theoretical frameworks on resilient educational management, highlighting leadership innovation, participatory governance, and community-based collaboration as essential factors for school sustainability in crisis scenarios. The research confirms that resilience in education is measured not only by the durability of infrastructure but also by the ability of school stakeholders to maintain pedagogical functions in extreme conditions, reduce psychosocial disruption, and ensure equitable access to learning opportunities. Consequently, disaster-responsive school administration should be embedded within a strategic, inclusive, and iterative framework, where preparedness, adaptation, and continuous learning are institutionalized as fundamental governance principles. This study enhances the existing information on educational disaster management and provides a realistic approach for schools in Indonesia and comparable regions to improve their preparedness and operational continuity in the face of increasing environmental risks..

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