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Understanding the Cause of Low Flood Mitigation Literacy among Junior High School Students

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Abstract:

This study examines the factors underlying the low level of flood mitigation literacy among seventhgrade students at SMPN 1 Plered, Cirebon Regency, Indonesia. Using a qualitative case study approach, it explores how pedagogical, structural, and sociocultural aspects influence students' understanding of flood disaster mitigation. Data were collected through semistructured interviews, participatory observation, and document analysis, and analyzed using the Miles, Huberman, and Saldaña (2014) interactive model, which includes data condensation, data display, and conclusion drawing. The findings indicate that students' limited flood mitigation literacy is caused by inadequate integration of mitigation concepts in the social studies curriculum, insufficient teacher competence in contextual and experiential disaster education, minimal conceptual reflection by students, and weak community participation in fostering disaster awareness. Structural constraints such as curriculum overload, limited use of digital learning media, and lack of disasterrelated resources exacerbate the issue. The study suggests that contextual, projectbased, and participatory learning models supported by digital technology and community collaboration can enhance disaster literacy in schools. Its novelty lies in linking simple environmental activities, such as *ecobrick* projects and community cleanups, to the development of students' flood mitigation literacy. The results contribute to the advancement of disasterresilient education through locally grounded and reflective pedagogical practices.

Keywords: *flood mitigation literacy, disaster education, social studies, contextual learning,, participatory approach, SMPN 1 Plered*

Introduction

Flooding represents one of the most destructive hydrometeorological phenomena globally, driven by climate change and the increasing intensity of extreme rainfall. Across various regions, unchecked anthropogenic activities have disrupted ecosystem equilibrium, exacerbated regional vulnerability to inundation, and threatened the sustainability of infrastructure and public health. The multidimensional impacts of these disasters necessitate responses that transcend mere structural technical measures, emphasizing the cultivation of ecological literacy and awareness from an early age. This aligns with the imperative for critical perspectives in disaster education that encourage students and educators to actively implement disaster management strategies within their environments (Mulianingsih & Rohsulina, 2024).

In Indonesia, flooding has become a serious perennial threat resulting from the degradation of Watersheds (DAS) and poor urban drainage management. Practices such as waste disposal into river systems and the narrowing of riparian zones significantly reduce the capacity of channels to manage discharge, ultimately triggering damaging surface runoff. Specifically, the Cirebon Regency, including the area surrounding SMPN 1 Plered, is classified as a high vulnerability zone according to InaRISK due to its flat topography and dense human activity. The urgency for mitigation in this region is critical, considering that active student participation in disaster education correlates significantly (0.823) with their level of preparedness in facing such risks (Syahputra & Wardhani, 2024).



Figure 1. Flood risk map of Cirebon Regency based on *InaRISK* (2024).

Extensive research has identified effective methodologies for enhancing disaster literacy and preparedness among students. Syahputra and Wardhani (2024) assert that formal mitigation education, through curriculum integration or extracurricular activities, is capable of elevating students to a "highly prepared" status. From a pedagogical standpoint, Mulianingsih and Rohsulina (2024) emphasize the importance of Critical Pedagogy in Social Studies (IPS) to foster students' critical consciousness, ensuring that learning extends beyond cognitive acquisition to drive transformative action. Furthermore, the utilization of digital technology has proven to be a vital catalyst; Minsas (2024) found that the use of YouTube and flood simulation animations stimulates enthusiastic group discussions and provides concrete visualizations of emergency response measures. Additionally, sociocultural aspects through socialization activities play a pivotal

role. Goma et al. (2022) explain that mitigation socialization serves as an effective behavioral modification process through information dissemination and motivation, aimed at aligning perceptions and increasing students' willingness to participate actively in social welfare efforts during disasters.

Despite the documented efficacy of digital media and socialization, a significant research gap remains regarding the fundamental barriers that cause mitigation literacy to persist at low levels in schools geographically situated in high-risk zones. Current literature predominantly focuses on final preparedness outcomes but has not explored in depth why the integration of mitigation concepts into the Social Studies curriculum often fails to translate into functional knowledge for students (Mulianingsih & Rohsulina, 2024). There is a scarcity of studies comprehensively dissecting inhibitory factors encompassing curriculum overload, teacher competence in experiential disaster education, and the limited availability of instructional resources relevant to the local geographical context. This research addresses this gap by mapping the root causes of low mitigation literacy among students who live in constant proximity to annual flood threats.

This study aims to analyze the factors contributing to low flood mitigation literacy among students at SMPN 1 Plered. The significance of this research lies in providing an empirical foundation for developing innovative, differentiated, and locally contextualized Social Studies learning models. Consequently, disaster education in schools will no longer be an abstract concept but will instead become an integral part of a robust safety culture for students. While previous studies, such as Morote et al. (2021), have extensively discussed the technical aspects of teacher training and the availability of climate-related educational resources, our research identifies a more complex structural and systemic barrier. Unlike Morote's focus which centers primarily on pedagogical skills, this study argues that in the Indonesian context, curriculum overload acts as a primary inhibitor that prevents even motivated teachers from effectively delivering flood mitigation literacy. This study shifts the focus from purely technical readiness to the intersection of structural constraints and local sociocultural apathy.

Method

This study employed a qualitative approach with a case study design to obtain an in-depth understanding of the factors contributing to students' low literacy in flood mitigation at SMPN 1 Plered, Cirebon Regency, Indonesia. The qualitative approach was chosen because it enables the exploration of complex social meanings, experiences, and interactions that cannot be adequately represented through quantitative data. As Yin (2018) explains, the case study strategy is particularly suitable for answering "how" and "why" questions regarding phenomena that occur within real-life contexts where the boundaries between the phenomenon and its environment are not clearly delineated.

The research was conducted at SMPN 1 Plered, a junior high school located in a flood-prone area of Cirebon Regency, which is categorized as a medium-to-high flood risk zone according to the national disaster risk mapping system, InaRISK (2024). Plered District was specifically selected as the research site because it experiences annual flooding with water levels reaching 50-100 cm during the peak of the rainy season, frequently disrupting the school's operational activities.

Participants were selected using purposive sampling, which allows researchers to choose individuals who possess specific knowledge or experience relevant to the research problem. In this study, the participants totaled 20 individuals, including 15 seventhgrade students, 3 social studies (IPS) teachers, and 2 community leaders who are actively involved in regional disaster management. This sampling strategy followed Creswell and Poth's (2018) recommendation that purposive selection enhances the richness and credibility of qualitative inquiry by focusing on informationrich cases that provide diverse perspectives.

Data collection employed three complementary techniques: indepth interviews, participatory observation, and document analysis. Semistructured interviews were conducted with teachers, students, and local residents to explore their perceptions, experiences, and attitudes toward flood mitigation education. The use of semistructured interviews provided flexibility for participants to express their views while allowing the researcher to probe emerging themes. In addition, participatory observations were carried out during classroom sessions and environmental activities such as ecobrick projects and school cleanup programs to gain contextual insights into how flood mitigation concepts were applied in practice. Document analysis complemented these methods by reviewing lesson plans, syllabi, and school reports related to disaster and environmental education. Together, these techniques formed a triangulated data collection process that enhanced the validity and credibility of the findings by allowing crossverification among multiple sources (Lincoln & Guba, 1985).

The data were analyzed using the interactive model developed by Miles, Huberman, and Saldaña (2014), which involves three concurrent stages: data condensation, data display, and conclusion drawing with verification. During the data condensation phase, the researcher selected and organized relevant information while discarding unrelated details. The data display phase involved organizing the condensed information into narrative summaries, thematic matrices, and conceptual diagrams to facilitate interpretation. Finally, conclusions were drawn and repeatedly verified by comparing emerging patterns with data obtained from various sources until data saturation was achieved when no new information emerged that could significantly alter the findings.

To ensure the trustworthiness of the study, triangulation of sources and methods was employed, along with member checking, in which the researcher confirmed interpretations with participants to ensure the findings accurately reflected their experiences. Ethical considerations were strictly observed throughout the research process. Given that the study involved minors, written informed consent was obtained from the students' parents or legal guardians, as well as assent from the students themselves. Adult participants also provided written consent prior to their participation. Furthermore, confidentiality was maintained through anonymization, and the data was used solely for academic purposes.

Through this case study approach, the research was able to capture the complex interactions between pedagogical practices, environmental conditions, and social contexts that shape students' literacy in flood mitigation. By integrating the voices of students, teachers, and community members, the study provides a comprehensive and contextually grounded understanding of how educational

processes and local realities intersect to influence disaster mitigation learning in school settings.

Results and Discussion

The findings of this research emphasize that the low level of flood mitigation literacy among students at SMPN 1 Plered is not an isolated pedagogical failure but rather the result of a complex interplay of pedagogical, structural, and socioenvironmental factors. This study identifies that while students possess a rudimentary awareness of flooding, their ability to articulate and implement specific mitigation and preparedness strategies remains significantly underdeveloped. This phenomenon reflects a broader systemic challenge within the Indonesian education landscape, where geographical vulnerability to hydrometeorological disasters is not yet matched by a robust and integrated disaster education framework.

1) Pedagogical Challenges and the Integration Gap

One of the primary findings of this study is the insufficient integration of flood mitigation concepts within the social studies (IPS) curriculum. At SMPN 1 Plered, disaster education is often treated as a peripheral topic rather than a core component of the environmental education syllabus. This lack of depth aligns with the observations of Amri et al. (2017), who argue that disaster risk reduction (DRR) education in Indonesia remains sporadically implemented. Despite the existence of national guidelines, the translation of these policies into local school curricula is often inconsistent, leaving schools in high-risk zones like Cirebon without a systematic approach to resilience building. The Ministry of Education, Culture, Research, and Technology (MoECRT, 2025) further underscores this in its recent report, highlighting that a significant number of schools in flood-prone districts have not yet reached the "disaster resilient school" (SPAB) standard due to curriculum density and a focus on cognitive-heavy assessments.

Furthermore, the pedagogical approach observed at the school remains predominantly teacher-centered, emphasizing the memorization of definitions rather than critical consciousness. Mulianingsih and Rohsulina (2024) advocate for a "critical pedagogy" in social studies that encourages students to analyze the sociopolitical and environmental roots of disasters. Without this critical lens, students at SMPN 1 Plered view flooding as an inevitable natural occurrence rather than a risk that can be managed through human intervention and spatial planning. This aligns with Logayah et al. (2023), who suggest that social studies should serve as a vehicle for preparing disaster resilient citizens by linking academic knowledge to local environmental realities.

2) The Paradox of Environmental Projects and Practical Understanding

A significant finding of this study relates to the school's implementation of environmental projects, specifically the production of ecobricks under the *Projek Penguatan Profil Pelajar Pancasila* (P5). While these activities were intended to address plastic waste issues, interviews revealed that students did not associate the activity with flood risk reduction. To most students, making ecobricks was a creative craft project or an extracurricular requirement, failing to trigger a "mitigation-oriented" mindset. This conceptual disconnect resonates with the work of Zaenab (2023), who found that school-based environmental activities in tropical floodplains often fail to foster long-term behavioral change when they are not supported by a comprehensive pedagogical framework that explicitly links

environmental conservation to disaster mitigation. At SMPN 1 Plered, the technical process of creating ecobricks overshadowed the conceptual understanding of drainage maintenance and the role of waste management in preventing inundation.

3) Teacher Competence and Instructional Media

The data also pointed to a critical gap in teacher competence regarding contextual and experiencebased disaster education. Teachers expressed difficulty in designing lessons that move beyond textbook examples to address the specific flood risks of the Plered district. This finding is consistent with the global observation by Gómez Trigueros and Seguido (2025), who emphasize that the effectiveness of flood risk education is largely dependent on the specialized training of teachers. Without adequate training in risk management and the use of modern pedagogical tools, educators struggle to create immersive learning environments.

A lack of digital technology and interactive media was identified as a major structural constraint. Students reported that most lessons relied on traditional lectures and static readings, which failed to visualize the spatial and temporal dynamics of flooding. Maryani (2022) argues that in the digital era, geography and social studies education must leverage Geographic Information Systems (GIS), satellite imagery, and interactive digital maps to enhance "spatial literacy." Such tools would allow students at SMPN 1 Plered to visualize flood patterns in their own neighborhoods, making the risk more concrete. The success of digital interventions is evidenced by Minsas (2024), whose research demonstrated that utilizing YouTubebased animations and flood simulations significantly increased student engagement and their ability to recall emergency response protocols. At SMPN 1 Plered, the absence of these resources forces a reliance on abstract knowledge, which is easily forgotten and rarely applied in emergency situations.

4) Engagement, Reflection, and Behavioral Resilience

The study identified that students' engagement with disaster concepts is largely passive. When asked about preparedness, most responses were limited to surfacelevel concepts like "not littering," which lacks the depth needed for comprehensive mitigation. There is a clear need for experiential learning models that emphasize reflection. Syahputra and Wardhani (2024) found a strong positive correlation between active student participation in mitigation education and their actual level of preparedness. At SMPN 1 Plered, the "participatory" element is missing; students are recipients of information rather than active participants in risk assessment. Juhadi et al. (2021) suggest that developing a specific disaster education model that includes simulation and local hazard mapping is essential to move students from mere awareness to functional literacy.

Sociocultural and Community Factors

The boundaries of the school do not exist in a vacuum, and the study found that community behavior significantly influences student literacy. Interviews with community members revealed that improper waste disposal into drainage systems remains a widespread practice. This sociocultural environment creates a "hidden curriculum" that contradicts the lessons taught in the classroom. Kamil et al. (2020) point out that geographic literacy is inextricably linked to the student's daily lived experience. When students see the communityand often their own familiesignoring mitigation practices, the school's message loses its authority. Goma et al. (2022) emphasize that socialization must involve a wider range of stakeholders to be

effective. At SMPN 1 Plered, the lack of synergy between the school, parents, and local government prevents the formation of a unified "safety culture." Mitigation literacy must therefore be viewed as a collective responsibility, requiring schoolcommunity partnerships to reinforce disasteraware behavior both inside and outside the classroom.

5) Structural and Curricular Limitations

Finally, the overcrowded curriculum represents a pervasive structural barrier. Teachers at SMPN 1 Plered noted that they are often pressured to complete a large number of standardized modules, leaving little time for "deep dives" into local disaster issues. This finding highlights a systemic conflict between standardized national testing and the need for localized, contextual education. Without dedicated space within the curriculum or a mandate from educational authorities to prioritize local hazards, flood mitigation will continue to be treated as an optional or supplementary theme.

6) Synthesis of Implications

In summary, the low flood mitigation literacy at SMPN 1 Plered is a multifaceted problem requiring a holistic solution. It requires a shift from cognitiveonly learning to a reflective, experiential, and technologysupported model as suggested by Maryani (2022) and Minsas (2024). It also necessitates a bridge between school activities and community practices through better socialization and stakeholder engagement (Goma et al., 2022). By addressing these pedagogical and structural gaps, disaster education can move from a theoretical exercise to a lifesaving competency that fosters genuine resilience among the younger generation. This study clarifies a significant causal interaction between the identified barriers. The findings suggest that curriculum overload is the root cause that triggers a "domino effect", it limits the time available for teachers to innovate, which leads to insufficient teacher competence in delivering experiential disaster education. This pedagogical gap results in students having a purely theoretical and passive understanding of mitigation. Furthermore, this internal school limitation is exacerbated by the lack of community participation. When students observe a community environment that ignores drainage maintenance, it creates a "negative reinforcement" that neutralizes the disaster-resilient values taught in the classroom. Thus, the low mitigation literacy is not caused by a single factor but by a synchronized failure between structural, pedagogical, and social systems.

Conclusion

The findings of this study demonstrate that the low level of flood mitigation literacy among students at SMPN 1 Plered results from an interplay of multiple interconnected factors encompassing pedagogical, structural, psychological, and social dimensions. These factors collectively shape students' limited understanding of disaster mitigation and their capacity to apply related knowledge in reallife situations. The primary causes identified include the limited integration of flood mitigation concepts within the school curriculum, teachers' insufficient competence in contextual and experiencebased disaster education, and students' minimal engagement with reflective and handson learning activities. Furthermore, the inadequate use of instructional media, weak support from local communities, and

school infrastructure that is not yet fully conducive to disaster preparedness practices exacerbate the issue.

These findings highlight the urgent need for a comprehensive and holistic strategy to improve disaster literacy in schools. Strengthening students' understanding of flood mitigation requires not only curriculum adjustments but also systemic improvements in teacher capacity, learning environments, and community involvement. Contextual and projectbased learning should be prioritized so that students can relate theoretical concepts to the realities of their local environment. Teachers must also be equipped with pedagogical and technological skills that enable them to design learning experiences integrating interactive mapping, digital simulations, and localized hazard analysis to make disaster education more meaningful.

Furthermore, collaboration among schools, parents, and local communities is essential to build a sustainable culture of disaster awareness. Schools can function as centers of communitybased disaster education by implementing joint projects such as environmental maintenance and neighborhood mapping of flood prone areas. Such partnerships would allow disaster literacy to move beyond classroom discussions and manifest as collective environmental responsibility.

In conclusion, this study underscores that disaster education should not be treated as a supplementary theme but as a core component of social studies learning, connecting humanenvironment interactions with civic and ecological responsibility. A participatory and technologysupported approach to learning can foster students' capacity to think critically about environmental risks and empower them to act as proactive agents of mitigation. Future research should focus on developing and testing specific technologyintegrated models and examining the longterm impact of improved schoolcommunity collaboration on disaster literacy outcomes. Through these efforts, disaster education can evolve into a more sustainable practice that prepares young generations to respond intelligently to the increasing risks of climaterelated disasters.

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