

Strengthening Disaster Mitigation Management for the Community and Primary and Secondary School Students at the Sigerincing Waterfall Site

Penguatan Manajemen Mitigasi Bencana bagi Komunitas Siswa/I Sekolah Dasar dan Menengah Di Situs Air Terjun Sigerincing

¹Febra Muyusari

²Yunita Dwijaya Pratiwi

³Ria Hopipah

⁴Zanur Haliza

^{1,2,3,4} Program Studi PGSD, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Merangin

Email Correspondence: moymumuy85@gmail.com

*Penulis Korespondensi

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Abstrak:

Kawasan Air Terjun Sigerincing yang merupakan bagian dari Merangin Jambi UNESCO Global Geopark memiliki potensi sumber daya geologi dan pariwisata yang tinggi, namun berada pada wilayah yang rawan terhadap bencana alam seperti banjir, tanah longsor, dan gempa bumi. Kondisi tersebut menuntut adanya upaya sistematis untuk meningkatkan kapasitas masyarakat dalam pengurangan risiko bencana. Penelitian ini bertujuan untuk menganalisis efektivitas penguatan manajemen mitigasi bencana berbasis komunitas dalam meningkatkan kesadaran dan kesiapsiagaan masyarakat di kawasan geopark. Metode penelitian yang digunakan adalah pendekatan deskriptif kualitatif melalui kegiatan edukasi, sosialisasi sistem peringatan dini, diskusi partisipatif, serta kunjungan lapangan ke fasilitas Indonesia Tsunami Early Warning System (ITEWS). Subjek kegiatan meliputi perangkat desa, unsur sekolah, komunitas lokal, dan operator sistem peringatan dini. Hasil penelitian menunjukkan bahwa kegiatan mitigasi bencana mampu meningkatkan pemahaman peserta mengenai potensi bahaya, mekanisme peringatan dini, serta pentingnya peran kearifan lokal dalam pengurangan risiko bencana. Selain itu, kegiatan ini juga memperkuat koordinasi lintas sektor dalam membangun budaya sadar bencana yang berkelanjutan di kawasan geopark. Dengan demikian, penguatan manajemen mitigasi bencana berbasis komunitas dinilai efektif sebagai model edukasi kebencanaan di wilayah rawan bencana.

Abstract:

The Sigerincing Waterfall area, which is part of the Merangin Jambi UNESCO Global Geopark, has high potential for geological and tourism resources, but is located in an area prone to natural disasters such as floods, landslides, and earthquakes. This condition necessitates systematic efforts to enhance community capacity in disaster risk reduction. This research aims to analyze the effectiveness of community-based disaster mitigation management strengthening in increasing community awareness and preparedness in the geopark area. The research method used is a descriptive qualitative approach through educational activities, socialization of the early warning system, participatory discussions, and field visits to the Indonesian Tsunami

Early Warning System (ITEWS) facilities. The subjects of the activity include village officials, school personnel, the local community, and early warning system operators. The research results show that disaster mitigation activities are able to increase participants' understanding of potential hazards, early warning mechanisms, and the importance of local wisdom's role in disaster risk reduction. In addition, this activity also strengthens cross-sectoral coordination in building a sustainable disaster-aware culture in the geopark area. Thus, strengthening community-based disaster mitigation management is considered effective as a model for disaster education in disaster-prone areas.



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INTRODUCTION

Indonesia is a country with a high level of disaster vulnerability due to its complex geographical and geological conditions. Indonesia's location at the convergence of three major global tectonic plates makes this region susceptible to various types of natural disasters, such as earthquakes, landslides, floods, and volcanic eruptions (Wekke, 2021). These conditions necessitate planned and systematic disaster risk reduction efforts involving all elements of society from an early age (Badan Nasional Penanggulangan Bencana [BNPB], 2020).

One area that possesses potential disaster threats is the Merangin Jambi UNESCO Global Geopark, specifically at the Sigerincing Waterfall Site. This area is characterized by hilly landscapes with relatively steep slopes and high rainfall intensity, making it prone to flash floods and landslides. On the other hand, the geopark area also functions as a space for education, conservation, and sustainable community economic development (UNESCO, 2017). Therefore, aspects of safety and community preparedness are essential parts of geopark management.

Disaster mitigation efforts focus not only on physical construction but also on strengthening human resource capacity through education and increasing public awareness (Nasution, 2025). Law Number 24 of 2007 emphasizes that disaster management is a shared responsibility between the government, the community, and educational institutions. Disaster education for communities as well as elementary and secondary school students is crucial because these groups are classified as vulnerable, yet they possess a strategic role in building a disaster-aware culture in their surrounding environment (BNPB, 2018).

Based on this background, this research aims to examine the strengthening of disaster mitigation management for communities and elementary and secondary school students at the Sigerincing Waterfall Site. This research is important and urgent as it is expected to make a tangible contribution to increasing community preparedness, supporting sustainable geopark management, and serving as a model for community and school-based disaster mitigation education.

Although various studies on community-based disaster mitigation have been conducted, the majority of prior research has predominantly focused on structural mitigation or general education within urban settings. There is a paucity of literature specifically examining the integration of disaster mitigation management within geotourism areas holding UNESCO Global Geopark status, where balancing conservation, education, and visitor safety presents a distinct challenge. Furthermore, the engagement of elementary and secondary school students as

agents of change within the geopark ecosystem remains underexplored. This scarcity of literature highlights a research gap that must be addressed to understand how disaster education can be tailored to unique local contexts such as geotourism sites (Chandra, 2026).

This study integrates the concepts of community-based disaster mitigation and School-Based Disaster Preparedness simultaneously within a single geological tourism area. This approach highlights not only aspects of individual preparedness but also how the synergy between local communities and educational institutions can strengthen the resilience of tourism areas against hydrometeorological threats. Consequently, this research does not merely replicate existing mitigation models; rather, it offers an adaptive model relevant to sustainable tourism development in disaster-prone regions, particularly within the Merangin Geopark, which holds international geological significance.

RESEARCH METHODS

This research employs a qualitative approach with a case study method, aiming to obtain an in-depth understanding of the process of strengthening disaster mitigation management for communities as well as elementary and secondary school students at the Sigerincing Waterfall Site. The qualitative approach was chosen because it is capable of exploring social phenomena contextually and comprehensively in accordance with the field conditions being studied (Creswell, 2014). The case study method is used because this research focuses on one specific location with certain disaster risk characteristics and directly involves local actors.

The type of data used in this research consists of primary data and secondary data. Primary data were obtained directly from respondents through field observations and interactions during disaster mitigation education activities involving the local community, village officials, teachers, and elementary and secondary school students. Secondary data were obtained from various written sources, such as activity reports, policy documents, laws and regulations, and scientific literature relevant to disasters and disaster mitigation education (Badan Nasional Penanggulangan Bencana [BNPB], 2018; BNPB, 2020).

Data collection techniques were carried out through several methods. First, direct observation was conducted to identify the physical environmental conditions of the area, potential hazards, and the initial response of the community and students to disaster risks. Second, documentation was used to collect supporting data in the form of activity photos, written reports, and official documents related to the implementation of disaster mitigation. Third, discussion and educational socialization were carried out as part of the research activities to obtain data regarding the participants' level of understanding, attitude, and preparedness toward disasters. This technique aligns with the principles of qualitative data collection which emphasize the active involvement of the researcher in the natural context of the research (Sugiyono, 2019).

Data analysis was performed using thematic analysis, namely by identifying, grouping, and interpreting the main themes emerging from the results of observations and documentation. The analysis stages included data reduction, data display, and systematic conclusion drawing to ensure the reliability of the research results (Miles & Huberman, 2014). Through this analysis procedure, the research is expected to have adequate validity and reliability and can be replicated by other researchers in the context of similar disaster-prone areas.

DISCUSSION

This discussion focuses on the analysis of strengthening disaster mitigation management for communities and elementary and secondary school students at the Sigerincing Waterfall Site, by linking research findings to the research objectives and theoretical framework presented in the introduction. The research results indicate that disaster mitigation education activities and the introduction of early warning systems were able to increase participants' understanding and awareness of potential disaster risks in the surrounding environment. These findings are in line with the research objective, which is to increase the capacity of the community and students in facing disaster threats in the geopark area.

The increased understanding of the community and students regarding disaster mitigation shows that the non-structural educational approach plays an important role in disaster risk reduction. BNPB (2018) emphasizes that disaster education provided systematically can form responsive attitudes and preparedness from an early age, especially in school-age groups. These research findings confirm the results of previous studies stating that the direct involvement of students in disaster mitigation activities can increase their knowledge and readiness in facing emergency situations (Amri et al., 2017).

Furthermore, the strengthening of community-based disaster mitigation management at the Sigerincing Waterfall Site demonstrates the importance of the role of the local community as main actors in disaster risk reduction. This approach aligns with the concept of community-based disaster risk reduction which emphasizes active community participation in identifying risks, planning mitigation actions, and building local capacity (Twigg, 2015). These research results reinforce previous research findings stating that community-based disaster mitigation is more effective than top-down approaches because it considers social contexts and local wisdom (Shaw et al., 2014).

The utilization of early warning systems in mitigation activities is also an important finding in this research. The early warning system functions as a main instrument in reducing the impact of disasters through the delivery of fast and accurate information to the community (BMKG, 2019). The research results show that participants gained a better understanding of the functions and mechanisms of the early warning system, which impacted their increased preparedness. This finding supports previous research results stating that the effectiveness of early warning systems is highly influenced by the level of public understanding of the information conveyed (Darliani, 2025).

Theoretically, these research findings strengthen the concept of non-structural disaster mitigation which places education and community empowerment as the main pillars of disaster risk reduction. Practically, the research results provide important implications for the management of geopark areas, specifically in integrating safety aspects and disaster education into sustainable tourism development. Thus, this research not only confirms previous findings but also provides a new contribution in the form of a model for strengthening disaster mitigation management that involves communities and educational institutions in geopark areas.

Strengthening Community and Student Capacity in Disaster Mitigation

Strengthening the capacity of the community and elementary and secondary school students is a key element in disaster risk reduction efforts in disaster-prone

areas. Research results show that the provision of structured disaster mitigation education is able to increase participants' understanding of potential threats, self-rescue actions, and individual roles in emergency situations. This finding aligns with the view that disaster education plays an important role in building community preparedness and resilience from an early age (Badan Nasional Penanggulangan Bencana [BNPB], 2018).

a. Increasing Understanding of Disaster Risk

The increase in understanding regarding disaster risk is evident from the participants' ability to recognize the types of hazards that potentially occur around the Sigerincing Waterfall Site. This knowledge is the initial stage in non-structural disaster mitigation aimed at reducing community vulnerability (BNPB, 2020). Previous studies also show that a good understanding of risk contributes to increased individual and group preparedness in facing disasters (Amri et al., 2017).

b. The Role of Formal Education in Disaster Mitigation

The involvement of elementary and secondary school students in disaster mitigation activities demonstrates that educational institutions have a strategic role in shaping a disaster-aware culture. Disaster education in schools not only increases cognitive knowledge but also builds the attitudes and practical skills needed in emergency situations (UNESCO, 2017). This finding confirms previous research results stating that schools are effective media for the internalization of disaster values (Shaw et al., 2014).

Figure 1.



Source: authors' documentation, 2025.

Integration of Early Warning Systems in Disaster Mitigation

The early warning system is an important component of disaster mitigation management because it provides initial information to the community before a disaster occurs. Research results show that the introduction of the early warning system increased the community's and students' preparedness to respond quickly and appropriately to potential disasters. This is in line with the concept of a people-centered early warning system which emphasizes community understanding as the main factor in the effectiveness of the early warning system (Darliani, 2025).

a. Understanding the Function and Mechanism of Early Warning Systems

Activity participants showed increased understanding regarding the function and mechanism of the early warning system after attending the socialization. This understanding is important because the effectiveness of the early warning

system depends not only on technology but also on the community's ability to interpret and respond to the information received (BMKG, 2019).

Figure 2.



Source: authors' documentation, 2025.

b. Practical Implications for Geopark Management

The integration of early warning systems in geopark area management provides practical implications for improving the safety of visitors and the local community. This approach supports the concept of sustainable geopark management which prioritizes aspects of conservation, education, and safety (UNESCO, 2017). Thus, strengthening disaster mitigation becomes an integral part of the development of safe and sustainable nature tourism.

Figure 3.



Source: authors' documentation, 2025.

CONCLUSION

The strengthening of disaster mitigation management for communities and elementary and secondary school students at the Sigerincing Waterfall Site is proven to increase knowledge, awareness, and preparedness for disaster risks. Participatory disaster mitigation education helps participants understand potential threats in the surrounding environment as well as basic steps in facing emergency situations. The involvement of educational institutions and local communities plays an important role in building a disaster-aware culture from an early age. The integration of disaster education with community participation encourages the formation of cross-sectoral collaboration that supports the management of the geopark area in a safe and sustainable manner, without ignoring conservation and tourism aspects. As a recommendation, community and school-based disaster mitigation strengthening needs to be implemented sustainably and integrated into

geopark management programs and learning activities. Future research is suggested to develop quantitative approaches and expand the study location so that research results can be applied more broadly to other disaster-prone areas.

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