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The Role of Schools and Local Policies in Disaster Mitigation in Kenegerian Sihotang, Harian District, Samosir Regency, North Sumatra Province, Indonesia

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Abstract
The purpose of this study was to explore the role of schools and local policies in disaster mitigation inKenegerian Sihotang, Harian District, Samosir Regency. This study used a qualitative approach withdescriptive analysis. Data on the role of schools in mitigation education were obtained through aquestionnaire. Data on teachers' perceptions of mitigation education were obtained through a questionnaireusing an attitude scale. To strengthen the quantitative data, in-depth interviews were also conducted. Theresearch results show that (1) schools have implemented disaster mitigation education within theIndependent Curriculum, both in intracurricular activities and in the Pancasila student profile strengtheningproject, so that students have the knowledge, skills, and attitudes related to disaster mitigation. (2) teachers'perceptions of mitigation education, including cognitive, affective, and skill aspects, are good. This goodperception needs to be improved to very good, as teachers serve as role models for the community, and theKenegerian Sihotang is located in a disaster-prone area. The novelty of this research lies in its holisticapproach to disaster mitigation education in disaster-prone areas through active school involvement andlocal policies, with a unique and minimally explored case study.

Keywords: Role of schools; disaster mitigation education; Kenegerian Sihotang

Introduction

Indonesia is one of the countries with a high level of vulnerability to natural disasters. Geographically, Indonesia is located at the confluence of three active tectonic plates: the Indo-Australian, Eurasian, and Pacific Plates (Syafitri & Didik, 2019). Furthermore, Indonesia is surrounded by numerous active volcanoes and is prone to earthquakes, landslides, floods, and various other hydrometeorological disasters (Rasdini, et. aI., 2021). In this situation, disaster mitigation efforts are a crucial aspect of sustainable development planning, particularly in areas at high risk of disasters.

Samosir Regency, located in North Sumatera Province, is a region with quite complex geographical and geological conditions. This area is located around Lake Toba, a large caldera formed by an ancient volcanic eruption. To this day, this area still has the potential for geological activity such as earthquakes. Furthermore, this region is also prone to landslides, particularly in hilly areas and steep slopes, including the Kenegerian Sihotang in Harian District. High rainfall and rampant deforestation exacerbate the region's landslide vulnerability. Kenegerian Sihotang itself is dominated by hilly terrain and has limited road infrastructure. In recent years, the area has experienced several landslides and small-scale earthquakes that disrupt community activities, damage infrastructure, and threaten the safety of residents. In Samosir Regency, a flash flood occurred on November 13, 2023. The flash flood, known locally as "surpu," caused extensive damage and created fear and trauma among the local community. The resulting material losses

were significant, including damage to and collapse of school buildings carried away by the water current. Public facilities were damaged, and fields and rice paddies were buried under rocks and mud. Many agricultural tools, such as tractors, generators, water pumps, cupboards, and jewelry, were lost or damaged by the current. Furthermore, school learning activities were disrupted and even halted for a time due to the damage to educational facilities, while students and teachers also experienced trauma. Therefore, it is important to evaluate the disaster mitigation measures that have been implemented, as well as to review the role of various stakeholders in the community, particularly schools, and local policies, in mitigating the impact of disasters.

Flash floods are hydrometeorological disasters influenced by various factors, such as land slope, topography, the presence of abundant surface water sources, and the blockage of river flows (Pandey & Vishwakarma, 2019; Javadinejad, 2022). In Indonesia, flash floods are generally caused by very heavy rainfall accompanied by landslides that block rivers, forming temporary dams, causing pressure on the river flow, ultimately overflowing, carrying particles at high speeds (Miladjara, A. N., & Rewa, K. A., 2024). Furthermore, flash floods can also be defined as water inundation caused by sudden overflow due to increased river discharge exceeding its capacity (Archer & Fowler, 2022; Ali, K., Bajracharyar & Raut, 2017). Flash floods are one of the most destructive natural disasters (Yin, J., 2023; Khan, T. A., 2020).

Schools hold a strategic position as educational institutions in instilling awareness and a responsive mindset towards disaster issues among students. More than just a place of learning, schools also serve as spaces for character building and social learning. Integrating disaster education into the curriculum can improve students' preparedness in facing disaster risks in their environment. Teachers play a crucial role in providing knowledge and skills on how to act before, during, and after a disaster. Therefore, the role of schools is crucial and strategic. Flash floods are hydrometeorological disasters influenced by various factors, such as land slope, topography, the presence of abundant surface water sources, and blockages in river flows (Pandey & Vishwakarma, 2019; Javadinejad, 2022). In Indonesia, flash floods are generally caused by extremely high rainfall accompanied by landslides that block rivers, forming temporary dams, causing pressure on the river flow, ultimately causing it to overflow, carrying particles at high speeds (Miladjara, A. N., & Rewa, K. A., 2024). Furthermore, flash floods can also be defined as water inundation caused by sudden overflow due to increased river discharge exceeding its capacity (Archer & Fowler, 2022; Ali, K., Bajracharyar & Raut, 2017). Flash floods are one of the most destructive natural disasters (Yin, J., 2023; Khan, T. A., 2020).

Based on the above description, given that Kenegerian Sihotang is vulnerable to disasters, disaster mitigation education is essential for elementary, middle, and high school students, as well as the community. For students, this education includes learning how to survive after a disaster. Disaster education is provided to students from an early age to develop an understanding of the types of disasters and disaster management measures at school, home, and in the community. Disaster mitigation in schools involves various measures to reduce the risks and impacts of disasters, as well as ensure the safety of students, teachers, and staff (Mulianingsih & Hardati, 2022; Shah et al., 2020).

Some disaster mitigation measures in schools include providing education to the school community (teachers, educational staff, students, and the surrounding community), conducting disaster training and simulations, developing disaster-resilient infrastructure, and integrating disaster mitigation materials into the curriculum. Disaster mitigation education is crucial, especially in disaster-prone areas. In general, disaster mitigation encompasses all efforts, from prevention before a disaster occurs to post-disaster response (McEntire, 2021; Phillips, 2023). The goals of mitigation education include understanding the types of disasters and their characteristics, recognizing the risks posed by disasters, developing disaster management skills, and efforts to minimize the impact of risks. For schools located in disaster-prone areas, meeting disaster mitigation standards is crucial, including having adequate facilities and infrastructure to protect students, staff, and the surrounding environment. This research was inspired by community service activities conducted in Harian District, Samosir Regency. Therefore, a study is needed to explore the role of schools in providing education to students and the community in Kenegerian Sihotang.

Empirically, the building of SMP Negeri 2 in Harian District does not meet the criteria for disaster-resistant infrastructure. Some buildings collapsed, and as of October 2023, the building washed away by the flash flood had not been rebuilt, awaiting assistance from the central government. This situation impacts the learning process, as the school is forced to utilize existing facilities while awaiting reconstruction by the government. Therefore, research into the role of schools and policies in disaster mitigation education at the elementary level in Harian District, Samosir Regency, is crucial. With disaster mitigation education, the school community will be better prepared to face disasters and can reduce potential risks.

This study is expected to provide a comprehensive overview of the involvement of schools and local policies in disaster mitigation efforts in Kenegerian Sihotang. This research will make an important contribution to developing more contextual, applicable, and participatory policy recommendations to increase community resilience to disasters at the local level. By examining the role of schools and local policies simultaneously, this study aims to demonstrate that disaster mitigation requires a holistic and integrated approach. Schools are not isolated entities, but rather part of a broader social system, where local policies can either support or limit their active role in enhancing disaster preparedness capacity. In this context, cross-sector collaboration and increased public awareness are key to successfully addressing disaster challenges.

Method

This study used a qualitative approach (Sihotang, 2023). The study was conducted in the odd semester of the 2024/2025 academic year at SMP Negeri 2 Kenegerian Sihotang. The location of this research was chosen based on community service activities following the flash flood disaster in Kenegerian Sihotang, which disrupted learning activities due to the school building being washed away. The study population consisted of all 16 teachers at SMP Negeri 2 Kenegerian Sihotang. Since the population size was less than 100, the entire population served as the research sample (Amin, N.F., 2023). Data were obtained through questionnaires and in-depth interviews with teachers and community members. Teachers' perceptions of disaster mitigation were collected through questionnaires with indicators: cognitive aspects, attitudes, and skills, using a Likert scale with options of strongly agree, agree, disagree, and strongly disagree. The questionnaire was adapted from previous research (Qurrotaini, L, 2020). Meanwhile, data on the role of schools in mitigation education was obtained through a questionnaire with questions. To strengthen the data, interviews were conducted with teachers (GS and GK) and two community members (KS and SIH). Data validation was carried out using triangulation of sources and data collection techniques. Primary data sources were obtained from teachers and the community. Meanwhile, data collection techniques used were in-depth interviews with two teachers (GS and GK) and a questionnaire. The data obtained were analyzed descriptively to describe the role of schools in mitigation education and teachers' perceptions of mitigation education in disaster-prone areas.

Results And Discussion

1. The Role of Schools in Disaster Mitigation Education in Kenegerian Sihotang, Harian District, Samosir Regency

Participants in this study were all 16 teachers at SMP Negeri 2 Harian. To determine the school's role in disaster mitigation research, the researchers interviewed the 16 teachers.

There ara 87.5% participants responded that there were school policies related to natural disaster preparedness in Samosir Regency. There are 12.5% participants stated that there were no school policies related to natural disaster preparedness in Samosir Regency. This suggests that the school community is generally aware of the mitigation policies programmed in the school, including local content on disaster management in the school curriculum. If two of the 16 stated that there were no school policies related to preparedness, this was due to a lack of awareness of the mitigation policies or their absence during the socialization. In line with the research results of Anggraeni, D. (2019), mitigation policies are incorporated into the curriculum. The curriculum includes the implementation of a curriculum on basic environmental education and disaster mitigation in elementary schools. One effort that can be made is to implement an

environmental education and disaster mitigation curriculum in schools. The environmental education and disaster mitigation curriculum in schools has a very important and strategic meaning in shaping a generation that cares and is responsive to the conditions of the surrounding environment. Schools as places for character formation and learning centers have a key role in instilling sustainable values and awareness of disaster risks from an early age. By incorporating environmental and disaster mitigation materials into the curriculum, students not only gain theoretical knowledge, but also practical skills to protect the environment and protect themselves during disasters. Not only students, but teachers also act as facilitators in learning. Environmental education builds awareness that humans are part of the ecosystem, so all activities must be carried out by considering their impact on nature. Meanwhile, disaster mitigation education strengthens students' preparedness for potential natural disasters such as earthquakes and floods, which frequently occur in Indonesia in general and in Samosir Regency in particular. These two educational aspects complement each other in shaping responsible, adaptive, and resilient student character. Furthermore, this curriculum integration also provides space for students to directly engage in real-world activities such as tree-planting programs at school, disaster evacuation simulations, and environmental risk mapping around the school. This encourages meaningful, contextual learning that is relevant to their daily lives and makes a real contribution to environmental sustainability. One school environmental education program is the Adiwiyata program (Budiaman, 2025). The Adiwiyata program aims to increase school community awareness of the environment at school, at home, and in the community. The Adiwiyata program aligns with Cole, L.B. (2014)'s Green School approach to teaching students about green technology, the social and psychological dimensions of green schools, and the green environment.

Overall, the implementation of environmental education and disaster mitigation curricula reflects a commitment to creating safe, environmentally conscious schools that are part of the solution to global and local challenges (Ramadhan & Indriyani, 2019; Kusumastuti, et. al., 2025). This is a long-term investment in developing future citizens who are ecologically intelligent, resilient in the face of disasters, and actively protect the earth as our shared home. Environmental education is a local content taught in schools; by integrating disaster risk reduction material into this local content, this capacity building can be achieved.

There are 25% participants stated that the implementation of mitigation policies was very successful, and 75% participants stated that the implementation of mitigation policies was quite successful. Based on Law No. 24 of 2007 concerning Disaster Management, Article 6 explains that the government is responsible for implementing disaster management, which includes several important aspects. First, the government is responsible for reducing disaster risks and integrating this risk reduction with development programs. Second, the government must protect the community from the impacts of disasters and ensure the fulfillment of the rights of the community and refugees fairly, in accordance with minimum service standards. Third, the government is also responsible for restoring conditions after a disaster, allocating an adequate disaster management budget in the state budget, and providing ready funds for emergency needs. Fourth, the government must maintain authentic and credible archives or documents related to disaster threats and impacts. However, in implementing these policies, various obstacles often arise, including a lack of coordination between related institutions, limited resources, and low levels of public knowledge and awareness regarding disaster issues. In its implementation, disaster management is a shared responsibility between the central government, regional governments, and the community (Dianty, 2022). This responsibility includes meeting the needs of disaster-affected communities, which is a form of state protection for its citizens.

There are 25% participants that mitigation education was successful in reducing disaster risk, and nine out of 16 respondents (56.25%) stated that disaster mitigation education resulted in increased public awareness of the environment and flood risk mitigation. These findings are supported by research by Jannah et al. (2023) that found that mitigation education activities through Community Service Programs successfully increased public awareness and knowledge of flood disasters, including actions to take before, during, and after a flood. Furthermore, public knowledge and awareness regarding waste sorting and processing, as well as the implementation of clean living behaviors during floods, have increased.

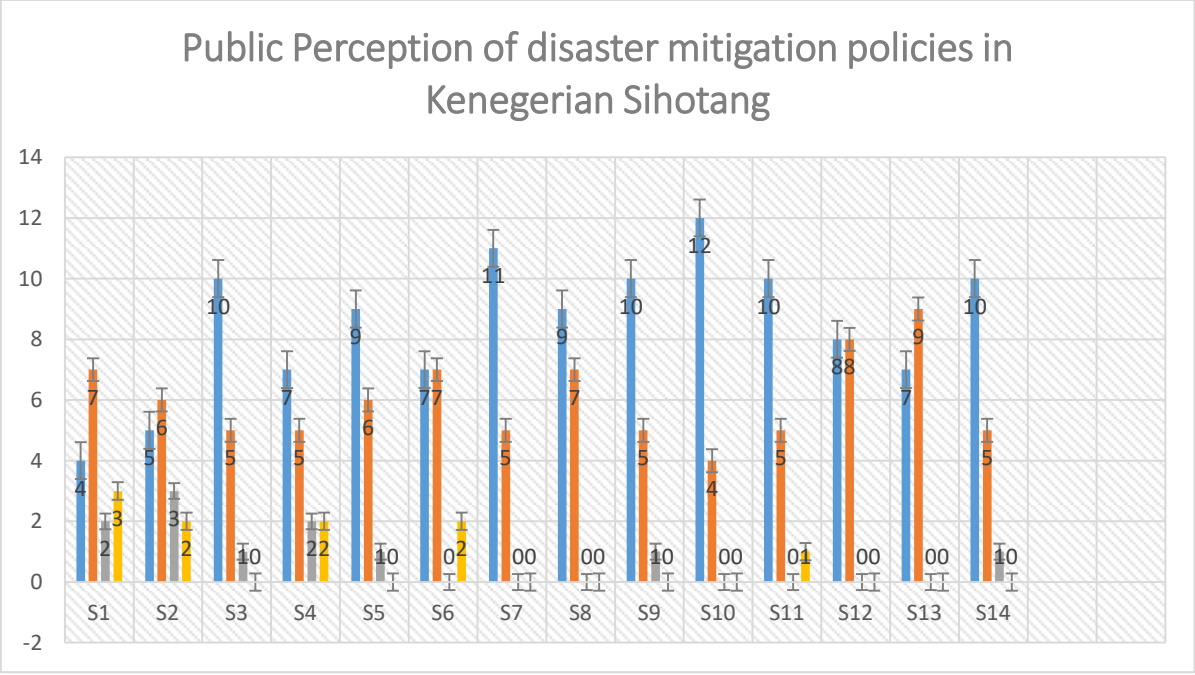
There are 87.5% participants stated that this mitigation policy contributed to reducing economic losses due to natural disasters or climate change, and 12.5% participants stated that the mitigation policy did not contribute to reducing economic losses due to natural disasters or climate change. This indicates that the school community generally understands that this mitigation policy contributes to reducing economic losses due to natural disasters or climate change. This is in line with the research findings of Dianty, J. (2022) that stipulates the government's responsibility to provide funds for natural disaster management, in accordance with Law No. 24 of 2007.

There are 68.75% participant stated that the school community was directly involved in mitigation activities, and 31.25% participants stated that they were not directly involved in climate change mitigation activities initiated by the government or related organizations. Thera are 68.75% of the school community has significantly contributed to mitigation activities by planting trees in the school environment. The school environment is spacious and includes a soccer field, which must be maintained to remain green. In addition, residents are involved in waste management by disposing of waste properly and separating organic and inorganic waste. Organic waste is composted. Waste management at the school is supported by the school's spacious grounds, which prevent disruption to the learning environment and the soccer field.

However, 31.25% of residents stated they were not directly involved. This indicates that although the majority of the school community is active, there is still a group that has not participated. Based on interviews with GR, they were not directly involved because they assumed the school had assigned specific individuals to be responsible. Furthermore, during the tree planting activity, the teacher in question was teaching or on other duties. This situation prompted the school to focus on implementing the reforestation program simultaneously, ensuring the involvement of all residents and shared responsibility.

2. Public perception of disaster mitigation policies in Kenegerian Sihotang, Harian District, Samosir Regency.

Based on data collected from a questionnaire, knowledge, attitudes, and behavior regarding disaster mitigation policies in Kenegerian Sihotang are presented in Figure 4.1a and 4.1b below.



4.1a. Perceptions of Disaster Mitigation Policies by item

Cognitif (S_1-S_5); Attitute (S_6-S_9); Skills (S_{10}-S_{14})

S_1 Kenegerian Sihotang is an area prone to disasters such as flash floods.

S_2 One of the problems in dealing with flash flood disasters is the limitations such as a lack of information or early warning.

S_3 Natural disasters have detrimental impacts on society, including trauma, damage to buildings, fields and rice fields, livestock casualties, etc.

S_4 One way to prepare for a flash flood disaster is for the public to not panic and wait for a warning from the government regarding alert status.

S_5 After receiving education about flash floods as a natural disaster, I can understand what to do if one occurs.

S_6 The following are things you should be aware of when a flash flood occurs, namely avoiding news or issues and not panicking.

S_7 One form of self-rescue action when a flash flood occurs is to go to the nearest evacuation site.

S_8 If a natural disaster occurs, such as a flash flood, the things that need to be saved or considered are human resources.

S_9 Vulnerable groups who receive treatment after counseling are mothers, children and the elderly.

S_{10} The community is given education and experience about flash flood disasters.

S_{11} The community is given training so that they do not panic if a natural disaster such as a flash flood occurs.

S_{12} Disaster mitigation is an effort to reduce the number of casualties and losses due to natural disasters.

S_{13} Preparedness is a concrete form of community action in facing flash flood disasters that can occur at any time.

S_{14} In disaster reduction, preparations need to be made, including preparedness, such as making evacuation and rescue plans and receiving training on disaster preparedness.

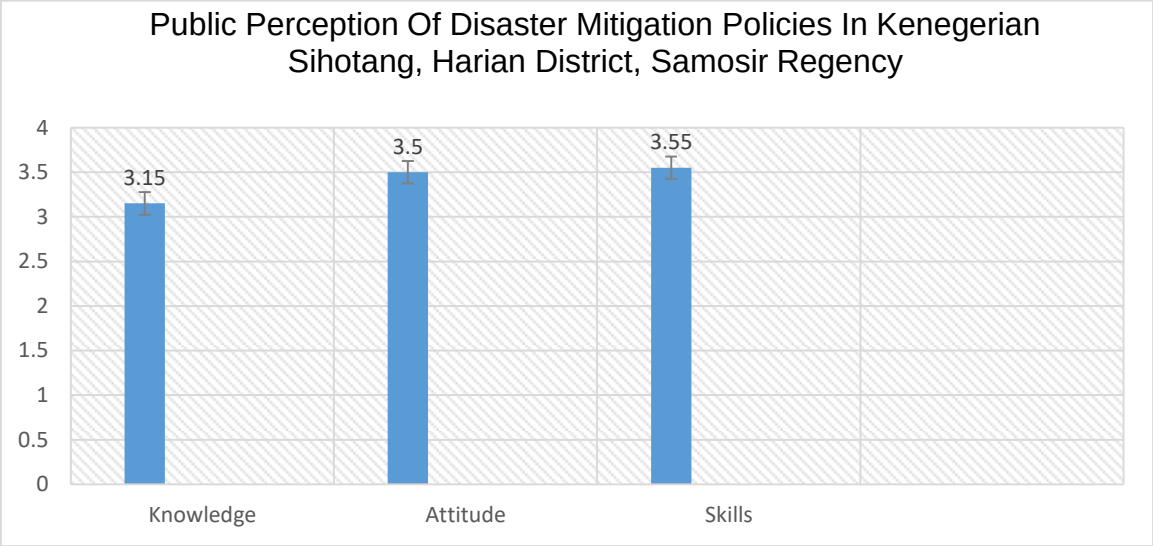


Figure 4.1b Perceptions of Disaster Mitigation Policies by indicator

The knowledge aspect regarding disaster mitigation policies had an average score of 3.15 (good). This can be interpreted as a good category of knowledge regarding flash flood mitigation, meaning that teachers at SMP Negeri 2 Harian have an adequate, accurate, and appropriate understanding of ways to prevent, reduce, and respond to the risk of flash floods effectively. Teachers are aware of the factors causing flash floods such as high rainfall, geographical conditions, forest damage, or poor drainage. In addition, teachers are aware that the Kenegerian Sihotang area is vulnerable to flash floods and their potential impacts on the environment and humans. Teachers are also aware of preventive measures ranging from early warnings, the need for public education, spatial planning, and evacuation systems. The community is aware of the early signs of flash floods, such as changes in river water color, thundering sounds, or continuous rain, and knows self-rescue steps and safe evacuation routes. It can be concluded that knowledge of flash flood mitigation policies is categorized as good, meaning that the community knows what to do before, during, and after a flash flood, but still needs improvement, as the knowledge score is 3.15 out of a maximum scale of 4. Previous research indicates that disaster mitigation in Lampung, through the Regional Disaster Management

Agency (BPBD), has been running optimally, but there are still obstacles, such as a lack of awareness among human resources regarding disaster mitigation (Nofermansyah, M., & Royani, N., 2024).

The attitude aspect regarding disaster mitigation policies has an average score of 3.50 (Very Good). This attitude aspect indicates that an individual or group has a high level of awareness. They recognize that human actions significantly influence the risk of flash floods, such as deforestation and littering. They also understand the importance of preserving nature and watersheds. They show a strong concern for mitigation policies. They care not only for themselves but also for the safety of others. They actively remind and encourage others to care about flood prevention. They also demonstrate a strong commitment to preventing and reducing the impact of flash floods. This attitude is reflected in daily behavior and community activities.

The behavioral aspect regarding disaster mitigation policies scored an average of 3.55 (Very Good). This reflects the proactive attitudes, awareness, and concrete actions of communities or individuals in preventing and reducing the risks of flash floods, such as damage to homes, fields and rice paddies, livestock being swept away, and so on. Public awareness demonstrates an understanding of the dangers and impacts of flash floods and the importance of early mitigation. Communities comply with regulations, such as not littering, not constructing buildings in flood-prone areas, and following evacuation procedures during early warnings. Communities are actively involved in mitigation activities, such as planting trees around their yards and land, participating in disaster preparedness training, and are able to respond quickly and appropriately to signs of disaster due to their knowledge, attitudes, and basic disaster preparedness skills. They also possess a spirit of togetherness in protecting the environment and helping others, especially in emergencies. So it can be concluded that the flash flood mitigation behavior in the very good category reflects a society that is aware of risks, complies with regulations, is active in prevention, is responsive, and has a high social concern for the environment and shared safety.

Conclusions And Suggestions

Conclusions are drawn from the research findings, highlighting the role of schools in disaster mitigation education in Kenegerian Sihotang, Harian District, Samosir Regency, through the implementation of policies within the environmental education and disaster mitigation curriculum. The environmental education and disaster mitigation curriculum is strategic in shaping a generation that is aware, concerned, and responsive to ecosystems. Furthermore, teachers' perceptions of mitigation policies were assessed. The knowledge aspect scored an average score of 3.15 (good), the attitude aspect scored an average score of 3.50 (very good), and the behavior aspect scored an average score of 3.55 (very good). The attitudes, awareness, and concrete actions of the community or individuals were proactive in preventing and reducing the risks of flash floods, such as damage to homes, fields and rice fields, livestock being swept away, and so on. Flash flood mitigation behavior categorized as "very good" reflects a community that is aware of risks, complies with regulations, is active in prevention, is responsive, and exhibits a high level of social concern for the environment and shared safety. A questionnaire was used to assess teachers' perceptions of mitigation education. Of the various factors influencing the role of schools in disaster mitigation education, two dominant factors are school policies related to flood preparedness and local school policies that can reduce economic losses.

Based on the findings of this study, it is recommended that schools integrate mitigation education and local policies into the school curriculum, even though disasters are unpredictable and rare, with the goal of instilling preparedness and providing disaster mitigation skills to school members and the community. Local school policies should provide mitigation tools and procedures, and be regularly disseminated to the community.

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