Geosfera: Jurnal Penelitian Geografi (GeoJPG)
Vol.5 No. 1 Juni 2026, Hal.61-68
DOI: https://doi.org/10.37905/geojpg.v5i1.39044

p - ISSN: 2962-5424
e - ISSN: 2962-5416

Students' Perceptions and Preparedness toward Flood Disaster Mitigation in a Flood-Prone School: Evidence from SMA Negeri 6 Anggrek

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Diterima: 20-05-2026 **Disetujui: 01-06-2026** **Publish: 10-06-2026**

Abstract *Floods are among the most frequent natural disasters in Indonesia and continue to disrupt educational activities, particularly in schools located in flood-prone areas. Strengthening students' awareness and preparedness is therefore essential for enhancing school resilience and reducing disaster risk. This study aimed to examine students' perceptions of flood disaster mitigation at SMA Negeri 6 Anggrek, North Gorontalo Regency, Indonesia, and to identify the relationship between their perceptions and preparedness levels. A quantitative descriptive approach was employed involving 191 students selected using proportional sampling. Data were collected through a Likert-scale questionnaire consisting of five indicators: understanding, attitude, preparedness, participation, and evaluation of school flood mitigation programs. Descriptive statistical analysis was conducted using mean score calculations for each indicator. The findings revealed that students demonstrated positive perceptions of flood disaster mitigation, reflected in good scores for understanding (3.82), attitude (3.74), participation (3.88), and evaluation of mitigation programs (3.70). However, preparedness obtained a lower mean score (2.95), indicating a moderate level of readiness. These findings highlight a gap between students' positive perceptions and their practical preparedness for flood emergencies. The results suggest that knowledge and positive attitudes alone are insufficient to ensure disaster readiness without regular simulation activities, evacuation drills, and experiential disaster education. Strengthening school-based disaster preparedness programs is therefore essential to improve students' capacity to respond effectively to flood hazards.*

Keywords: *Flood Disaster Mitigation; Students' Perceptions; Disaster Preparedness; Disaster Education; School Resilience*

1. INTRODUCTION

Floods are among the most frequent and destructive natural hazards in Indonesia, causing significant social, economic, environmental, and educational impacts. As an archipelagic country located in a tropical climate zone, Indonesia experiences high rainfall intensity throughout the year, making many regions highly susceptible to flooding. Natural factors such as lowland topography, high precipitation, and poorly managed watersheds contribute substantially to flood occurrence. These conditions are further aggravated by anthropogenic activities, including land-use change, deforestation, unplanned urban development, and inadequate drainage systems, which increase both the frequency and magnitude of flood events (BNPB, 2021).

The impacts of floods extend beyond physical damage to infrastructure, settlements, public facilities, and agricultural land. Flood disasters also disrupt social activities, threaten public health, and negatively affect educational processes. Within educational settings, flooding frequently interrupts teaching and learning activities, damages school facilities, reduces instructional effectiveness, and limits students' access to education. Consequently, disaster mitigation has become an essential component of sustainable disaster risk reduction efforts, particularly in disaster-prone communities (Nurjanah & Sari, 2020).

Disaster mitigation encompasses a series of structural and non-structural measures aimed at reducing disaster risks and minimizing potential losses. While governments play a central role in disaster management, effective mitigation also requires active participation from communities, including students. As members of the younger generation, students represent an important stakeholder group in disaster risk reduction because they can contribute to strengthening disaster awareness and preparedness both within schools and in the broader community. Their involvement is increasingly recognized as a key element in building resilient societies capable of adapting to disaster risks (Budiman et al., 2024).

Education has been widely acknowledged as one of the most effective approaches for enhancing disaster awareness and preparedness among students. Through disaster education programs, students can develop knowledge, attitudes, and practical skills related to disaster mitigation, including understanding

disaster causes, recognizing early warning signs, and implementing appropriate response measures before, during, and after disaster events. Educational interventions have been shown to improve disaster-related competencies and strengthen students' adaptive capacity in disaster-prone environments (Setyowati, 2020). Consequently, students' perceptions toward disaster mitigation become an important factor influencing their willingness to engage in preparedness activities and adopt risk-reduction behaviors.

Previous studies have demonstrated that positive perceptions and adequate disaster knowledge contribute to higher levels of disaster preparedness among students. School-based disaster education has been reported to improve awareness, risk perception, and participation in disaster risk reduction activities. Nevertheless, several studies have also indicated that high levels of knowledge do not always translate into practical preparedness. Differences in disaster experience, environmental exposure, access to information, and institutional support often influence students' readiness to respond effectively during emergency situations (Wulandari & Pratama, 2023). These findings suggest that understanding students' perceptions alone is insufficient unless accompanied by an assessment of how those perceptions are reflected in preparedness behavior.

In Gorontalo Province, particularly North Gorontalo Regency, flooding remains one of the most frequently occurring disasters and continues to pose significant challenges to local communities. Seasonal rainfall patterns, low-lying landscapes, and river overflow contribute to recurrent flood events in several areas of the regency. Consequently, disaster mitigation efforts in the region should not only emphasize structural measures but also focus on strengthening human resource capacity through disaster education and preparedness programs (BNPB, 2023).

SMA Negeri 6 Anggrek is located in an area that is potentially exposed to flood hazards, making it an important setting for investigating students' perceptions and preparedness toward flood mitigation. As a school situated in a disaster-prone environment, it provides a strategic context for evaluating the effectiveness of disaster education initiatives and identifying factors that influence students' readiness to face flood hazards.

Although numerous studies have examined disaster education, disaster awareness, and flood preparedness among students, most previous research has primarily focused on measuring knowledge levels or evaluating disaster education programs. Limited attention has been given to examining the relationship between students' perceptions of flood mitigation and their actual preparedness in flood-prone school environments. Furthermore, empirical studies addressing this issue in North Gorontalo Regency remain scarce, despite the region's recurrent exposure to flood hazards. This gap indicates the need for context-specific research that investigates how students perceive flood mitigation and whether positive perceptions are accompanied by adequate preparedness.

The novelty of this study lies in its integrated assessment of students' perceptions of flood disaster mitigation through five dimensions, namely understanding, attitude, preparedness, participation, and evaluation of school mitigation programs within a flood-prone educational environment. Unlike previous studies that predominantly emphasize knowledge acquisition or disaster education outcomes, this study highlights the discrepancy between students' positive perceptions and their practical preparedness. By identifying this gap, the study provides a more comprehensive understanding of the effectiveness of school-based disaster mitigation efforts and contributes to the development of evidence-based strategies for strengthening disaster preparedness in educational institutions.

Therefore, this study aims to analyze students' perceptions of flood disaster mitigation at SMA Negeri 6 Anggrek, North Gorontalo Regency, Indonesia. The findings are expected to contribute to the advancement of disaster education research, provide insights into the relationship between perception and preparedness, and support schools and policymakers in designing more effective disaster risk reduction programs within educational settings.

2. RESEARCH METHOD

This study employed a quantitative approach using a descriptive survey design to examine students' perceptions of flood disaster mitigation at SMA Negeri 6 Anggrek, North Gorontalo Regency, Indonesia. A quantitative approach was selected because it enables the measurement of perceptions through numerical data and facilitates systematic analysis of students' responses regarding disaster mitigation. The descriptive survey design was considered appropriate because the study aimed to describe the existing

condition of students' perceptions without manipulating any research variables. The investigation focused on five dimensions of flood disaster mitigation, namely understanding, attitude, preparedness, participation, and evaluation of school mitigation programs.

2.1 Study Area

The study was conducted at SMA Negeri 6 Anggrek, located in Anggrek District, North Gorontalo Regency, Gorontalo Province, Indonesia. The school was selected because it is situated within an area that is frequently affected by flood events, particularly during periods of intense rainfall. Flood inundation occurring in the surrounding environment has made disaster mitigation an important component of school preparedness efforts.

As an educational institution located in a flood-prone area, SMA Negeri 6 Anggrek provides a relevant context for assessing students' perceptions of disaster mitigation and evaluating the effectiveness of school-based disaster education initiatives.

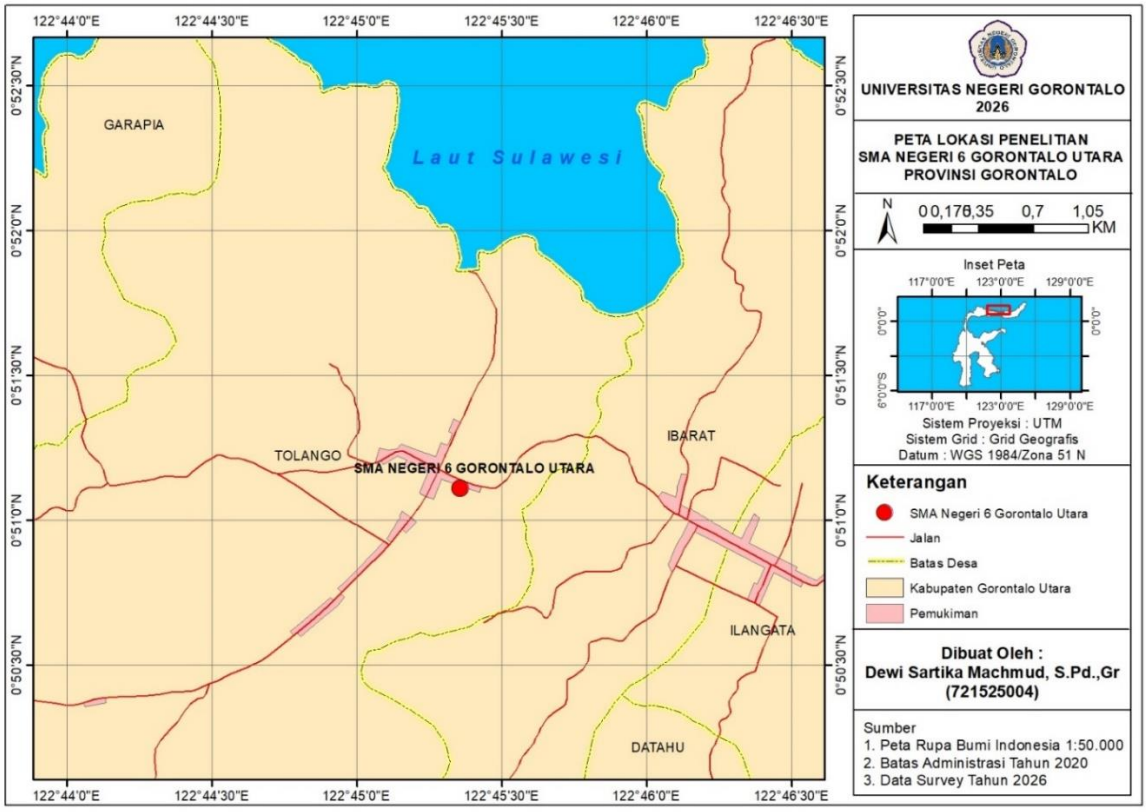

Figure 1. Study Area

2.2 Population and Sample

The study population consisted of all students enrolled at SMA Negeri 6 Anggrek during the 2026 academic year, totaling 367 students distributed across Grades 10, 11, and 12. To obtain a representative sample, the Slovin formula was applied with an acceptable margin of error, resulting in a sample size of 191 respondents.

A proportional sampling technique was employed to ensure adequate representation from each grade level. Consequently, 58 students were selected from Grade 10, 64 students from Grade 11, and 69 students from Grade 12. The proportional distribution of respondents was intended to minimize sampling bias and improve the representativeness of the findings.

Table 1. Number of Students and Research Samples by Grade Level

No	Grade Level	Number of Students	Number of Samples
1	Grade 10	112	58
2	Grade 11	123	64
3	Grade 12	132	69
	Total	367	191

2.3 Research Variables and Indicators

The main variable investigated in this study was students' perceptions of flood disaster mitigation. The measurement indicators were adapted from Abdul et al. (2024) and modified to suit the context of flood mitigation within the school environment. The variables and indicators used in this study are presented in Table 2.

Table 2. Research Variables and Indicators

Variable	Indicators
Students' perceptions of flood disaster mitigation	Understanding of flood disaster mitigation
	Students' attitudes toward the importance of flood mitigation
	Students' preparedness for flood disasters
	Students' participation in mitigation activities
	Evaluation of school flood mitigation programs

Source: Adapted from Abdul et al. (2024)

2.4 Data Collection Technique

Primary data were collected using a structured questionnaire administered through Google Forms. The questionnaire link was distributed to students via official WhatsApp groups for Grades 10, 11, and 12. Prior to participation, respondents were informed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses.

The questionnaire employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This measurement scale was used to assess students' perceptions across all research indicators. Online data collection was selected because it enabled efficient distribution of questionnaires and facilitated responses from a relatively large number of participants within a limited time frame.

2.5 Instrument Validity and Reliability

Prior to data collection, the questionnaire instrument underwent validity and reliability assessment to ensure the quality of the measurement tool. Content validity was established by aligning questionnaire items with theoretical concepts related to disaster mitigation, disaster preparedness, and students' perceptions. Several modifications were made to ensure the suitability of the instrument for the context of flood mitigation in schools. Reliability testing was conducted to evaluate the consistency of responses across questionnaire items. The validity and reliability assessment ensured that the instrument accurately measured the intended indicators and produced stable results for subsequent analysis.

2.6 Data Analysis Technique

The collected data were analyzed using descriptive statistical techniques to examine students' perceptions of flood disaster mitigation at SMA Negeri 6 Anggrek. Descriptive statistics were selected because the study aimed to describe the characteristics of respondents' perceptions across the investigated indicators rather than to test causal relationships between variables.

Data obtained from the Likert-scale questionnaire were first tabulated and then processed to calculate the mean score for each indicator, including understanding, attitude, preparedness, participation, and evaluation of school flood mitigation programs. The mean score was used to determine the overall tendency of students' perceptions toward flood disaster mitigation.

The mean score was calculated using the following equation :

$$X = \frac{\sum X}{N}$$

Where:

$\bar{X}$ = mean score

ΣX = total score obtained from all respondents

N = total number of respondents

Table 3. Classification of Mean Scores

Mean Score	Category
1.00–1.80	Very Poor
1.81–2.60	Poor
2.61–3.40	Fair
3.41–4.20	Good
4.21–5.00	Very Good

The descriptive results were subsequently interpreted to identify the strengths and weaknesses of students' perceptions regarding flood disaster mitigation. Particular attention was given to differences among the five indicators in order to determine which aspects of disaster mitigation require further improvement. The findings were then discussed in relation to previous studies on disaster education, risk perception, and disaster preparedness to provide a broader understanding of students' readiness to cope with flood hazards in school environments.

3. RESULT AND DISCUSSION

3.1 Students' Perceptions of Flood Disaster Mitigation

The analysis of students' perceptions toward flood disaster mitigation revealed varying levels across the five investigated indicators. As presented in Table 4, participation in mitigation activities obtained the highest mean score (3.88), followed by understanding of flood disaster mitigation (3.82), attitudes toward flood mitigation (3.74), and evaluation of school mitigation programs (3.70), all categorized as good. In contrast, preparedness for flood disasters received a mean score of 2.95, which falls within the fair category. Overall, these findings indicate that students generally possess positive perceptions regarding flood disaster mitigation; however, their practical readiness to respond to flood emergencies remains relatively limited.

Table 4. Mean Scores of Each Indicator

No	Indicator	Mean Score	Category
1	Understanding of Flood Disaster Mitigation	3.82	Good
2	Students' Attitudes toward the Importance of Flood Disaster Mitigation	3.74	Good
3	Students' Preparedness for Flood Disasters	2.95	Fair
4	Students' Participation in Mitigation Activities	3.88	Good
5	Evaluation of School Mitigation Programs	3.70	Good

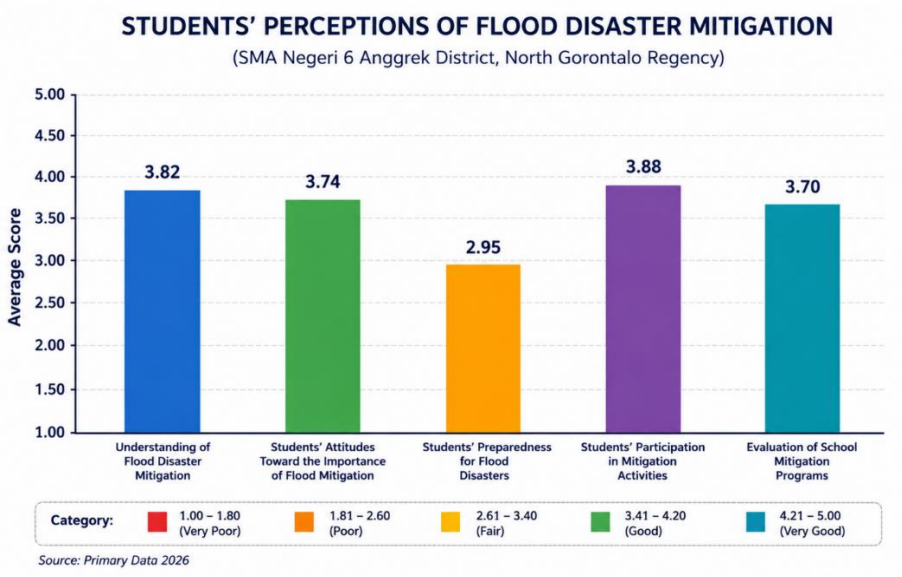

Figure 2. Student Perceptions of Flood Disaster Mitigation

The variation among indicators reveals an important pattern. While students demonstrate satisfactory levels of understanding, positive attitudes, and active participation in mitigation-related activities, these strengths are not fully translated into disaster preparedness. This finding suggests that disaster knowledge and positive perceptions alone may not be sufficient to develop adequate preparedness unless supported by practical experiences and continuous training. Similar observations have been reported in disaster education studies, which emphasize that preparedness is influenced not only by cognitive factors but also by repeated exposure to simulation exercises and emergency response practices (Setyowati, 2020; Wulandari & Pratama, 2023).

3.2 Students' Understanding of Flood Disaster Mitigation

Students demonstrated a relatively high level of understanding regarding flood disaster mitigation, with a mean score of 3.82 categorized as good. This result indicates that most students are familiar with the causes of flooding, potential disaster impacts, and basic mitigation measures that can be implemented before, during, and after flood events. A high level of understanding reflects the effectiveness of information dissemination and disaster education activities received by students through formal and informal learning processes.

Knowledge is widely recognized as the foundation of disaster risk reduction behavior because it shapes risk perception and influences decision-making during emergencies. Students who understand disaster mechanisms tend to be more aware of environmental hazards and more capable of identifying appropriate response strategies. The present finding supports previous studies reporting that disaster education significantly improves students' awareness and understanding of disaster risks (Setyowati, 2020). However, the existence of students who still reported lower levels of understanding suggests that disaster education programs should be strengthened to ensure that disaster-related knowledge is distributed more evenly across the student population.

3.3 Students' Attitudes toward the Importance of Flood Mitigation

The attitude indicator obtained a mean score of 3.74, indicating that students generally hold positive views regarding the importance of flood disaster mitigation. Positive attitudes are essential because they influence students' willingness to engage in preparedness activities and support disaster risk reduction initiatives. Students who perceive mitigation as important are more likely to adopt preventive behaviors and participate in collective efforts aimed at reducing disaster impacts.

This result is consistent with previous research suggesting that positive attitudes toward disaster mitigation contribute significantly to disaster awareness and adaptive behavior (Wulandari & Pratama, 2023). Positive attitudes also indicate that students recognize flood hazards as a relevant threat within their environment. Nevertheless, attitudes alone cannot guarantee preparedness. The discrepancy between positive attitudes and moderate preparedness observed in this study indicates that affective awareness must be complemented by practical preparedness programs to generate effective disaster response capacities.

3.4 Students' Preparedness for Flood Disasters

Preparedness emerged as the weakest dimension among all investigated indicators, with a mean score of 2.95 categorized as fair. This finding represents the most important result of the study because it highlights a gap between students' positive perceptions and their actual readiness to respond during flood emergencies. Despite demonstrating good levels of understanding and attitudes, students have not yet developed adequate preparedness skills required for effective emergency response.

Several factors may explain this condition. First, preparedness is strongly associated with practical experience rather than knowledge alone. Students who rarely participate in evacuation drills or emergency simulations may experience difficulties in applying disaster knowledge during real events. Second, limited exposure to disaster scenarios can reduce students' confidence in making decisions under emergency conditions. Third, the absence of regular preparedness training may hinder the development of procedural knowledge necessary during evacuation and response activities.

These findings support the argument that disaster education should move beyond theoretical instruction and incorporate experiential learning approaches. Simulation-based learning, evacuation exercises, and scenario-based disaster training have been shown to improve preparedness more effectively than classroom instruction alone. Therefore, strengthening practical preparedness programs should become a priority for schools located in flood-prone areas.

3.5 Students' Participation in Mitigation Activities

Participation in mitigation activities obtained the highest mean score among all indicators (3.88), indicating that students are actively involved in disaster-related activities organized by the school. Active participation reflects students' willingness to contribute to collective disaster risk reduction efforts and demonstrates a positive level of engagement with school mitigation programs. Participation is considered an important component of disaster resilience because it facilitates the transfer of knowledge into practical action and encourages the development of a disaster-aware culture.

The high participation score suggests that students perceive mitigation activities as relevant and beneficial. Nevertheless, active participation does not automatically result in higher preparedness levels. This finding further reinforces the existence of a preparedness gap and suggests that participation activities should be designed to include more hands-on experiences, practical exercises, and emergency response simulations. Such activities may help transform participation into measurable preparedness outcomes.

3.6 Evaluation of School Flood Mitigation Programs

Students generally evaluated the school's flood mitigation programs positively, as reflected by a mean score of 3.70. This result indicates that students perceive the existing mitigation initiatives as useful in enhancing awareness and understanding of flood-related risks. Schools play a crucial role in developing disaster resilience because they function as centers for knowledge dissemination and preparedness development. Effective school-based mitigation programs can contribute significantly to strengthening disaster awareness among students.

Despite receiving positive evaluations, the moderate preparedness score indicates that current mitigation programs may place greater emphasis on awareness-building than on practical preparedness development. Consequently, future mitigation initiatives should integrate more experiential learning components, including evacuation drills, emergency simulations, and collaboration with disaster management agencies. Such improvements are expected to enhance both individual preparedness and institutional resilience in facing future flood hazards.

3.7 Implications for School-Based Disaster Risk Reduction

The findings demonstrate that positive perceptions, high participation, and favorable evaluations of mitigation programs do not necessarily guarantee adequate preparedness. This study highlights the importance of bridging the gap between awareness and action in disaster education. Schools located in disaster-prone areas should not only focus on improving students' knowledge and attitudes but also prioritize the development of practical preparedness competencies.

From a disaster risk reduction perspective, strengthening preparedness through regular simulations, evacuation drills, and experiential disaster education can enhance students' adaptive capacity and improve school resilience. These efforts are particularly important for educational institutions located in flood-prone regions, where students are regularly exposed to disaster risks. Therefore, integrating preparedness-oriented learning into school disaster management programs should become a strategic priority for strengthening disaster resilience in educational settings.

4. CONCLUSION

This study examined students' perceptions of flood disaster mitigation at SMA Negeri 6 Anggrek, a school located in a flood-prone area of North Gorontalo Regency. The findings indicate that students generally demonstrate positive perceptions toward flood disaster mitigation, as reflected in good levels of understanding, attitudes, participation, and evaluation of school mitigation programs. These results

suggest that disaster awareness and risk perception among students have been developed through existing educational and mitigation initiatives implemented within the school environment.

Despite these positive perceptions, students' preparedness was found to be only moderate, indicating that awareness and positive attitudes do not necessarily translate into adequate readiness to respond during flood emergencies. This finding highlights a critical gap between disaster knowledge and practical preparedness, suggesting that cognitive understanding alone is insufficient to ensure effective disaster response capacity.

The study contributes to the growing body of disaster education research by demonstrating the importance of integrating preparedness-oriented learning into school-based disaster risk reduction programs. Strengthening disaster preparedness through regular evacuation drills, simulation-based learning, and experiential disaster education is essential for improving students' adaptive capacity and enhancing school resilience in flood-prone areas. Future studies are recommended to investigate the factors influencing the gap between disaster perception and preparedness and to employ more advanced analytical approaches to examine the relationship between disaster education, risk perception, and preparedness among students.

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