



Smart Flood Preparedness: Mitigation and Preparedness Education

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ABSTRACT

Abstract: Floods are natural disasters that consistently dominate disaster events in Indonesia and have a significant impact on economic, social, environmental, health, and educational aspects. Data from the National Disaster Management Agency (BNPB) shows that floods cause damage to infrastructure, loss of assets, disruption of economic activities, and an increased risk of post-disaster illness and fatalities. Gorontalo Province is an area with a high level of flood vulnerability, especially Gorontalo City. Based on Gorontalo Provincial Statistics data in 2024, there were 9 sub-districts affected by floods, 47 out of 50 villages submerged, and as many as 39,784 people affected. This flood condition not only has an impact on the residential environment, but also threatens public facilities such as schools. Standing water in the school environment has the potential to damage educational infrastructure and increase the risk of diseases such as diarrhea, acute respiratory infections (ARI), leptospirosis, and skin diseases. Therefore, the involvement of schools in flood disaster mitigation efforts is very important. Schools have a strategic role as a center for disaster education and behavior change through increased knowledge, preparedness, and disaster mitigation simulations. Integrated disaster education in the school environment is expected to be able to increase the preparedness of school residents and effectively reduce the impact of floods.

INTRODUCTION

According to data from the National Disaster Management Agency (BNPB), floods consistently dominate the statistics of disaster events every year, causing significant losses in terms of economy, social, and environment. These losses include damage to infrastructure, loss of property assets, disruption to economic activities, and threats to public health through the spread of post-flood diseases and fatalities. Likewise, most areas in Gorontalo Province have a significant level of flood vulnerability. Flooding, especially during the high-intensity rainy season, routinely hits several districts and cities.

According to Gorontalo provincial statistical data, the Gorontalo city area is the highest flood-prone area with 2024 data there are 9 sub-districts affected by floods, 47 villages out of a total of 50 villages are submerged and there are 39,784 people affected by floods. Flooding is a drastic increase in the flow of rivers, ponds, lakes and others, with excess flows flowing out of water bodies. If an event of water submersion in an area threatens and disrupts people's lives and livelihoods resulting in human casualties, environmental damage, property losses, and psychological impacts, the flood can be called a Flood Disaster (BNPB, 2022).

This condition shows that the flood problem is not only a technical environmental affair, but also has a direct impact on health and education aspects. Therefore, it is important to involve schools in flood disaster mitigation efforts. Schools as one of the public facilities are also often victims of floods. Stagnant water in the school environment not only damages learning facilities, but also threatens the health of students. Flooded school environments can be breeding grounds for mosquitoes and bacteria, which cause various diseases such as diarrhea, acute respiratory infections (ARI), leptospirosis, and skin diseases (Nugraha, 2025).

Schools have great potential to become centers for education and behavior change, because through education, students can be trained to become a generation that is aware of the importance of protecting the environment and health. Disaster education is one of the most important strategic steps to improve preparedness (Nugraha, 2025). Through the disaster knowledge provided, the community, especially schools, can recognize the signs of disaster danger and what actions should be taken before a disaster occurs. Disaster impact reduction can be prevented through knowledge of prevention and mitigation measures. A well-educated community will be better prepared to respond to disasters effectively. Education combined with simple simulations has been proven to be able to strengthen the response when floods occur (Mulyati, 2025).

METHODS

This service activity is carried out through a **participatory and educational approach**, involving students, lecturers, the community, schools, and related partners. The implementation method includes several stages as follows:

1. Preparation Stage

a) **Survey and Location Observation**

Conducting surveys in flood-prone areas, as well as the preparedness of schools that are the target of activities.

b) **Coordination with Partners**

Coordinate with schools, and related agencies such as BPBD and Puskesmas for technical and administrative support.

c) **Preparation of Educational Materials and Media**

Prepare ppt materials about floods (e.g. evacuation routes, disaster signs, etc.).

2. Implementation Stage

a) **Flood Mitigation Socialization and Education**

Providing education to the community and students about the causes of flooding, how to prevent it, and emergency response through:

- Face-to-face counseling

This activity is carried out by delivering material directly in the classroom or school hall. The counseling contains an explanation of the causes of floods, their impacts, and preventive measures that students can take in the home and school environment.

- Interactive discussions

Students were invited to have a dialogue and ask about their experiences during floods and how they knew how to deal with them. This discussion aims to increase understanding and build students' confidence in anticipating disasters.

- Visual media and hands-on practice

The material was delivered using pictures, posters, short videos, and simple demonstrations of self-rescue measures. Students are also given the opportunity to practice basic evacuation methods, observation of safe routes, as well as simple actions that can be taken when floods start to occur.

RESULTS

Increasing Students' Knowledge and Awareness about Flood Disasters and Their Risks

MTs Al Huda students experienced an increased understanding of the meaning of flood disasters, the factors that cause floods, the impact on health, the environment, and community activities, as well as mitigation measures that can be taken before, during, and after floods. Students become more aware that the area where they live and the school environment have a potential risk of flooding, so early vigilance and preparedness are needed to reduce the possible impact.

Figure 1. Delivery of Materials



1. **Improved Emergency Response Skills and Student Courage and Active Participation**
Through simple practice and simulations, students gain basic skills in dealing with flood emergencies, such as recognizing the early signs of flooding, determining safe evacuation routes, and conducting self-evacuation in an orderly and safe manner. Interactive discussion activities encourage students to actively ask questions, express opinions, and share experiences related to flood events that have been experienced, so that students' confidence and involvement in preparedness activities increase.
2. **Increasing Environmental Awareness**
Students understand the importance of maintaining environmental cleanliness as part of flood mitigation efforts, such as not littering, maintaining clean waterways, and supporting greening activities in the school environment and around residences.
3. **The Formation of the Commitment to the Formation of the "Flood Preparedness Students" Group and the Role of Schools in Benefactor Education**
This activity resulted in an initial agreement between the school and the implementation team to form a group of "Flood Preparedness Students" who play a role in supporting disaster preparedness in the school environment. The school demonstrates a commitment to integrating flood mitigation education into teaching and learning activities and extracurricular activities as part of the formation of a disaster-aware culture.



Figure 2. Simulation

4. **The Preparation of the Basis of the Sustainability Program and Student Empowerment as Agents of Change**
The existence of a program sustainability plan through continuous assistance and the involvement of various parties is the basis for ensuring that flood mitigation education can continue to run consistently. Students are encouraged to become agents of change in improving disaster preparedness in the school environment and the surrounding community through the dissemination of information and the implementation of clean and safe living behaviors from flood risk

DISCUSSION

Based on the results of the activities that have been carried out, it can be concluded that the main problem in the form of low knowledge and preparedness of students for flood disasters can be responded to effectively through a structured and participatory educational approach (BNPB, 2021). Flood mitigation education delivered directly, supported by visual media and simple practices, has been proven to be able to increase students' understanding gradually and thoroughly. (Ministry of Education and Culture, 2019)

A learning approach that involves direct discussion and practice has a stronger impact than one-way delivery of material. Through interactive discussions, students not only become recipients of information, but are also actively involved in the learning process. This helps students to relate the material presented to the real experiences they face in the surrounding environment, so that understanding becomes more contextual and easy to remember (Wisner, et al., 2019).

The implementation of a simple evacuation simulation is one of the important aspects of this activity. Simulations provide a real picture of emergency situations and help students understand the steps that need to be taken quickly and precisely. With simulations, the potential for panic that often arises during disasters can be minimized because students already have an overview and initial experience in dealing with these conditions.

School empowerment as a disaster education center is an important point in the discussion of this activity. Schools have a strategic role in shaping the character and behavior of students, including in terms of disaster preparedness. The integration of flood mitigation education into teaching and learning activities and extracurricular activities will strengthen the culture of disaster awareness in the school environment. The establishment of the "Flood Alert Students" group is a concrete step in ensuring the sustainability of the program and the active involvement of students in a sustainable manner (Ministry of Education and Culture, 2019).

From an environmental perspective, increasing students' awareness of the importance of maintaining cleanliness and environmental sustainability is a significant positive impact. Environmental problems such as clogged waterways and the habit of littering are factors that aggravate the risk of flooding (UNDRR, 2019). With students' increased understanding, it is hoped that there will be behavioural changes that contribute to flood prevention efforts, both in the school environment and in the environment where they live.

This activity also shows the importance of cross-sector collaboration in disaster risk reduction. The involvement of students, lecturers, schools, BPBD, Puskesmas, and the village government strengthens the implementation of activities and supports the program's sustainability plan. This collaboration allows for continuous assistance, disaster information updates, and strengthening the capacity of communities and schools in dealing with flood risks (BNPB, 2021).

Overall, flood disaster education and mitigation activities at MTs Al Huda have a real positive impact in increasing students' knowledge, skills, and awareness of disaster preparedness. With the support of various parties and the sustainability of the planned program, this activity is expected to be able to contribute to minimizing health impacts, material losses, and environmental disturbances due to flood disasters in the future.

CONCLUSION

The flood disaster education and mitigation activities carried out at MTs Al Huda have gone well and achieved the expected goals. Through an educational and participatory approach, this activity is able to increase students' knowledge, skills, and awareness of flood disaster risks and mitigation efforts that can be carried out before, during, and after disasters occur.

The results of the activity showed that the provision of education combined with interactive discussions, visual media, as well as simple practices and simulations was effective in improving student preparedness. Students not only understand the concept of flood mitigation theoretically, but are also able to practice basic emergency response measures, recognize evacuation routes, and show a more vigilant attitude towards potential flood risks in school and residential environments.

In addition, this activity succeeded in encouraging the role of schools as disaster education centers through the commitment to form a group "Flood Preparedness Students" and the integration of disaster mitigation materials into

learning and extracurricular activities. Collaboration between students, lecturers, schools, BPBD, Puskesmas, and the village government has also strengthened the implementation of activities and is an important basis for the sustainability of flood mitigation programs in the future.

ADVICE

a. On behalf of the school

Schools are expected to follow up on this activity by forming and activating the "Flood Preparedness Students" group on an ongoing basis and integrating disaster mitigation education into teaching and learning activities and extracurriculars so that a culture of disaster awareness can be embedded from an early age.

b. For Students

Students are expected to be able to apply the knowledge and skills that have been acquired in daily life, both in the school environment and in the residential environment, as well as play an active role as agents of change in maintaining environmental cleanliness and disaster preparedness.

c. For the Community and Local Government

The community and the village/sub-district government are expected to support flood mitigation efforts through mutual cooperation activities, maintenance of drainage channels, and the provision of sustainable disaster information in collaboration with schools and related agencies.

d. For Related Agencies and Partners

BPBD, Puskesmas, and related agencies are expected to continue to provide assistance through advanced training, periodic simulations, and post-flood health education to strengthen community preparedness and resilience to flood disasters.

e. For the Next Service Activities

Similar activities are recommended to be carried out on an ongoing basis and extended to schools or other areas with high levels of flood vulnerability, with the addition of quantitative evaluations such as pre-tests and post-tests to measure knowledge improvement and preparedness more objectively.

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