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Improving Disaster Mitigation Capability from an Early Age by Strengthening Disaster Literacy for Students at SD Negeri 10 Bonepantai Bone Bolango Regency

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Abstract
Tihu Village is located on the southern coast of Gorontalo and is included in an area prone to earthquakes and tsunamis. The impact of the earthquake and tsunami disaster can be in the form of loss of life and material. The losses incurred as a result of a disaster are usually caused by the local community's lack of responsiveness in dealing with an impending disaster. Mitigation efforts are needed in tsunami-prone areas to prevent casualties and material losses. Mitigation efforts can be carried out by socializing the earthquake and tsunami disaster and making tsunami evacuation routes. The programs implemented through this service activity are: 1) survey of potential disasters and identification of disaster-prone zones; 2) manufacture of disaster risk reduction information boards; 3) construction of evacuation route boards and assembly points; 4) Socialization of earthquake and tsunami disaster risk reduction; 5) Installation of evacuation route boards and assembly points.
Keywords: Disaster, Earthquake, Tsunami, Evacuation, Socialization.

INTRODUCTION

Based on the geological setting, the island of Sulawesi is in the middle of three major plates, namely the Eurasian Plate in the north, the Pacific Plate in the east and the Australian Indian Plate in the south. This region can be interpreted as the result of several collision events (Rudyawan et al. 2014).

The distribution of the main earthquake events in each region or region of northern Sulawesi based on the results of the uniformity of the earthquake magnitude scale is almost evenly distributed. This indicates that this area is very vulnerable to earthquakes and tsunamis. Medium and deep earthquakes mostly occur around the Sulawesi Sea as a result of deep earthquakes from the collision of the Maluku Sea and the subduction of the Philippine Sea plate. Many shallow earthquakes occur along the North Arm of Sulawesi including Gorontalo as a result of the Sulawesi Sea Subduction and active faults (Pasau and Tanauma, 2011; Manyoe et al. 2019).

The Gorontalo area is an earthquake and tsunami prone area because it is located close to the Sulawesi Sea subduction route in the north and the East Sangihe subduction route and Colo Volcano in the south (Manyoe et al. 2019). Tsunamis have different

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movements in deep and shallow water. In the deep sea, tsunami waves are not as dangerous as in shallow seas and areas near the coast (Pasau and Tanauma, 2011).

The impact of the tsunami disaster can be in the form of loss of life and material. The losses incurred as a result of a disaster are usually caused by the local community's lack of responsiveness in dealing with an impending disaster. Mitigation efforts are needed in tsunami-prone areas to prevent casualties and material losses. Mitigation efforts can be carried out by socializing the earthquake and tsunami disaster and creating a tsunami evacuation zone.

Figure 1. The location of SD Negeri 10 Bone Pantai which is directly opposite the Tomini Bay is a disaster-prone area. The subduction zone is marked in yellow. Colo Volcano is marked in red. Subduction zones and volcanoes are two factors that trigger disasters (Google Earth, 2021).

The location of the community service is in Tihu Village, Bonepantai District, Bone Bolango Regency, Gorontalo Province (Fig. 1). The location of the community service is facing the waters of Tomini Bay so that it has the potential for a tsunami disaster (Fig. 2). The location of the community service also has the potential for tectonic earthquakes (Manyoe et al. 2019).

An understanding of earthquake and tsunami disaster mitigation must be provided from an early age. The curriculum of schools in Indonesia does not yet contain material on mitigation so that increasing disaster mitigation capabilities is expected to increase students' knowledge of mitigation.

Improving students' mitigation abilities is done by strengthening disaster literacy. Improvement of mitigation capacity is focused on increasing knowledge and capacity of tectonic earthquake and tsunami disaster mitigation.

Disaster literacy is an effort related to awareness in dealing with disasters (Afrian and Islami 2019). Disaster literacy must be possessed by students considering the

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geological conditions of Indonesia which are prone to disasters. Disaster literacy from an early age is one of the determinants of disaster risk reduction.

Figure 2. SD Negeri 10 Bonepantai, Bone Bolango Regency.

Strengthening disaster literacy for students is carried out through various forms of media. Students are given materials on disaster preparedness education. Furthermore, disaster literacy is given through media such as books, songs, and posters. The purpose of community service activities in Tihu Village, Bonepantai District, Bone Bolango Regency, Gorontalo Province is to improve mitigation abilities from an early age in elementary school students. Improving mitigation capacity through strengthening disaster literacy skills.

METHODS

The method of implementing community service activities with the title "Improving Disaster Mitigation Capability from an Early Age by Strengthening Disaster Literacy for Students at SD Negeri 10 Bonepantai, Bone Bolango Regency" includes three implementation methods. The three implementation methods are: 1) Preparation and debriefing; 2) Description of the service program; 3) Description of program actions.

Community service activities were carried out during the COVID-19 pandemic so that the service was not carried out in schools but was carried out in the Tihu Village office hall. The program targets consist of village officials, village communities (parents of students) and students. Changes in the location of service and program targets were

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caused by the COVID-19 pandemic which did not allow for the opening of schools and the collection of large numbers of students.

3.1 Preparation

1. Mechanism of implementation of Service activities
   The mechanism for implementing Community Service activities includes the following stages: a) Site preparation; b) Coordination with local offices/governments; c) Team preparation and briefing meetings for students who assist in community service activities.
2. Materials for preparation and debriefing of community service activities
   Preparation materials for the team and briefing for students who take part in community service activities (Table 2).

Table 2. Materials for preparation and debriefing of service activities

Material by lecturer
a) Ethics in socializing with elementary school students and the community
b) How to deliver socialization materials
c) Selection of information board installation location
d) Determination of evacuation routes and assembly points
e) Disaster risk reduction action program in the form of installation of disaster information boards as well as evacuation route boards and assembly points

3.2 Description of Community Service Program

The community service program consists of programs, sub programs, and methods of implementation. Community service programs are shown in table 3.

Table 3. Programs and methods of implementing community service activities

No	Program	Sub Program	Methods
1	Identification and survey	a) Identification and survey of disaster-prone zones	Literature study and field observation
2	Information board creation	a) Creation of disaster risk reduction information boards	Design and creation
3	Creation of evacuation route boards and assembly points	a) Making evacuation route boards b) Making an assembly point board	Design and creation
4	Socialization	a) Socialization of disaster risk reduction	Socialization
5	Disaster risk reduction actions	a) Installation of disaster information boards b) Installation of evacuation route boards and assembly points	Installation

3.3 Description of Community Service Actions

The description of community service actions can be described as follows:

1. Disaster Potential Identification and Survey

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The methods used are literature studies and field observation methods in the form of collecting data on potential disaster points in the village. The survey was carried out throughout the hamlet. Identification of disaster-prone zones is carried out by looking at the history of earthquakes, the regional geological conditions of the village in collaboration with the results of field observations.

2. Making Disaster Risk Reduction Information Board

The implementation method is in the form of design and creation. The disaster risk reduction information board is designed and created based on the results of a survey of potential disasters.

3. Making Evacuation Route Boards and Assembly Points Boards

The implementation method is design and creation. The evacuation route boards and assembly points are intended to serve as a guide to evacuation directions and the location of community assembly points in the event of a disaster.

4. Socialization of Disaster Risk Reduction

The implementation method is in the form of socialization of disaster risk reduction. Disaster risk reduction is focused on socializing earthquake and tsunami disaster risk reduction.

5. Disaster Risk Reduction Action Program

The implementation method is a program of installing evacuation route boards and assembly points. Evacuation route boards are installed at the edges of the road starting from the coastal area to the assembly point on a higher and more stable topography.

RESULTS AND DISCUSSION

The implementation of the community service program in Tihu Village consists of five programs. The results of the implementation of these programs are described below.

5.1 Disaster Potential Survey and Identification of Disaster Zones

The results obtained in this program are the availability of survey data. This activity is intended to make observations to all hamlets in Tihu Village. This data is the basic data for the potential for village disasters. The data collected consists of:

a. Residential coordinate data;
b. Coordinate data of public facilities.
c. Coordinate data of potential disaster;
d. Disaster type data;
e. Coordinate data for the installation of disaster information boards, disaster evacuation routes and location of assembly points.

Data collection was carried out using a GPS receiver, smartphone camera and geological writing instruments. The settlements of the Tihu Village community are concentrated in the coastal area. The same applies to public facilities such as schools, village government offices and health service centers.

Based on the history of the earthquake, the regional geological conditions of the village in collaboration with the results of field observations concluded that the types of disasters in Tihu Village were earthquakes and tsunamis. The location of settlements and public facilities near the coast is a disaster-prone zone.

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5.2 Creation Disaster Risk Reduction Information Board

This activity is the activity of making a disaster risk reduction information board. The disaster risk reduction in formation board contains information and steps for tsunami disaster mitigation.

Figure 3. Tihu Village tsunami risk reduction information board.

The Tihu Village disaster information board contains information on the tsunami disaster and tsunami disaster mitigation measures including the definition of tsunami, the causes of tsunamis, and the process of tsunami occurrence (Fig. 3). The information board is made and designed with an attractive poster design so that it attracts students and the public. The disaster risk reduction information board contains information on tsunami

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disasters and disaster mitigation measures. Information boards are installed at disaster-prone zone points in the village.

5.4 Creation of Evacuation Route Boards and Assembly Points

This activity is the activity of making evacuation route boards and assembly points (Fig. 4). The evacuation route boards and assembly points are intended to serve as directions for evacuation and the location of community assembly points in the event of a disaster.

Figure 4. Example of evacuation sign

Figure 5. Example of assembly point sign

Evacuation route boards and assembly points are in Indonesian and English (Fig. 5). The use of English to accommodate foreigners who visit coastal and underwater tourist sites in Tihu Village.

5.5 Socialization Disaster Risk Reduction

The implementation method is in the form of socialization of disaster risk reduction. Socialization of disaster risk reduction is focused on reducing the risk of

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earthquakes and tsunamis (Fig. 6). The socialization was held in the Tihu Village office hall, attended by village officials, parents and several students (Fig. 7).

Figure 6. Socialization in the Tihu Village office hall

Students, parents and society in general gain knowledge through socialization of disaster risk reduction. Great appreciation from the village community in the socialization of disaster risk reduction carried out by the implementing team in Tihu Village.

Figure 7. Students and parents of students who attend socialization activities

5.7 Disaster Risk Reduction Program

After the survey, making disaster risk reduction information boards, making evacuation route boards, assembly points, and socializing disaster risk reduction, the next step is the disaster risk reduction action program. The implementation method is the

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installation of information boards, evacuation boards and assembly points (Fig. 8). Installation of evacuation route boards starts from coastal locations to hills (Fig. 9). The location of the assembly point is in a hilly area.

Figure 8. Installation of tsunami risk reduction information boards

Figure 9. Installation of evacuation route boards

Some of the follow-up programs that can be carried out by the village government, village youth organizations and schools are:

1. Conduct further socialization to the entire community regarding disaster risk reduction obtained during the implementation of collaborative service.
2. The collaborative service program that produces information boards and evacuation routes then becomes the basis for realizing Tihu Village as a disaster response village.

3. The village disaster response program can be realized by collaborating with the Regional Disaster Management Agency (BPBD) of Bone Bolango Regency.

CONCLUSION

The collaborative community service program in Tihu Village contributes to the importance of reducing the risk of earthquake and tsunami disasters. The collaborative service program produces disaster risk reduction information boards, evacuation route boards, and assembly points. These outcomes can be the first step in efforts to reduce disaster risk in Tihu Village. Students, parents and society in general gain knowledge through socialization of disaster risk reduction. Disaster reduction information can be read by students, parents and the community because it is installed at strategic points in the village. The disaster risk reduction program through collaborative community service is supported by an action program for installing evacuation route signs and assembly points. The importance of cooperation from all parties to create a disaster-resilient village both from the government, universities and the community. Socialization and action programs need to be carried out in schools with a larger number of students after the COVID-19 pandemic ends.

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