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# Socialization and Education of Mount Sinabung's Cold Lava Flood Disaster Mitigation, Karo District, North Sumatra Province

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***Abstract:*** *This study aims to increase students' knowledge about cold lava disaster mitigation through disaster preparedness socialization activities to realize school and community disaster resilience. The methods used are in the form of exposure and explanation of the theory of lava flood mitigation, interactive discussions, giving questionnaires, interviews with qualitative analysis approaches, field trips (field education) and describing cold lava sediment material, plotting locations as well as providing direction on functions and early warning systems and emergency response. on the banks of the river (lau Borus). Involving 45 students from SMA N.1 Tiganderket in Sukatendel village, there are 10 people. The results achieved from this study indicate that the knowledge of the general public and the education community has been able to mention various types of disasters, both natural and non-natural disasters, the education community also understands natural disasters and understands explaining disaster management and has provided answers about various types of disaster management procedures. lava flood disaster and is quite good, so it is hoped that follow-up and optimal results are expected to increase students' knowledge about disaster mitigation and the realization of disaster-resilient schools and communities.*

## INTRODUCTION

Indonesia's geographical location is located at the confluence of three tectonic plates, namely the Indo-Australian plate, the Eurasian plate and the Pacific plate, which causes Indonesia to be traversed by two world mountain paths, namely the Pacific Circum and the Mediterranean Circum. Flood disaster is an event that occurs due to the debut of the river flow which is relatively larger than the normal flow in general, this occurs due to continuous rainfall that causes river water to overflow because it is not sufficient to accommodate the rainwater puddles. In Law No. 24 of 2007 concerning Disaster Management Article 44 letter C, that is, mitigation is to reduce disaster risk for people who are prone to disasters. Disaster mitigation is a term used to indicate an action to reduce the impact of a disaster, which can later be carried out before the

disaster occurs and at the same time reduce risks in the long term. According to Rinaldi (2009),, disaster preparedness of the Indonesian people is still weak, this is evidenced by the large number of casualties and property victims from every disaster incident, to reduce the risk of a disaster, increasing understanding through knowledge has an important urgency. One way to increase awareness is to change one's knowledge of something (Duval, et al, 2000). Increased knowledge to be aware of disaster preparedness can be done through socialization with the aim of educating the important role for the educator community and the general public as knowledge that involves affective, cognitive, and psychomotor activities related to students' daily lives (Mushtaq & Khan, 2012) which build knowledge and abilities (Sumarni et al., 2016). Furthermore, it is stated that children have a higher disaster vulnerability compared to adults, this is because children are still not able to control and prepare themselves during a disaster situation. (Sulistyaningsih, 2011; F Herdwiyanti & Sudaryono, 2013).

The research area of Mount Sinabung Since it first erupted on August 27, 2010, it emits volcanic material, volcanic smoke and ash, lava and sedimentary material mixed with rainwater which becomes cold lava material in the rainy season.

The targets for research and educational dissemination of disaster mitigation community service in areas prone to cold lava floods are 45 people from Tiganderket State High in Tiganderket village. The results show that disaster mitigation is an effort to reduce or deal with the risks and impacts of disasters. Knowledge of students and Karang Tarunan groups about types of disasters has mentioned various types of disasters, both natural and non-natural disasters. The knowledge of school students in explaining disaster management procedures has provided answers about various types of disaster management procedures. The disaster management procedure most often mentioned is cold lava flood disaster management. The conclusion from this sufficient research is that knowledge and insight about disaster mitigation among school students is good.

## THEORETICAL BASIS

Based on data on disaster events in several locations in community service areas on Tuesday, May 10, 2016 The cold lava disaster that hit residential areas in Tiganderket District, then on 23/4/2020, the Cold lava flood which also brought wood and stone materials made the path overflowing lava. Damage to regional infrastructure and many victims. On 27/8/2021, “Four victims survived. We suspect that five people have died as a result of the cold lava flood and three of them have been found dead, in Sukatendel village, Karo Regency. This shows that the importance of knowledge about disasters and disaster risk reduction from an early age to provide understanding and guidance on steps that must be taken when a threat occurs in the vicinity to reduce disaster risk. (Sunarto, 2012).. Schools have a very strategic role in disaster management efforts, because schools are able to improve students' knowledge and skills in dealing with disasters. Schools as educational units have the responsibility to provide education, especially regarding disaster preparedness. Disaster education should start at an early age. This is based on the fact that every year it is estimated that around 66 million children worldwide are affected by disasters (Herdwiyanti & Sudaryono, 2013). Lopez et al (2012), stated that community involvement in disaster management made the most positive contribution to disaster rescue, recovery and rehabilitation. Involvement in providing insight and knowledge of early childhood is a positive way to be a component part in disaster risk reductionmenyatakan bahwa keterlibatan masyarakat dalam manajemen bencana memberikan kontribusi paling positif menuju penyelamatan, pemulihan dan rehabilitasi bencana. Involvement in providing insight and knowledge of early childhood is a positive way to be a component part in disaster risk reduction.

Knowledge about disaster mitigation must be obtained through information media or mass media (Haddow, 2008; Mahmoud & Auter, 2009), providing information and interpersonal. The following is a theoretical proposal, namely that comprehensively the need for comprehensive school security can be achieved through policies and plans that are in line with disaster management at the national, provincial, district/city, and school levels. by the three pillars are as follows (**Figure** 1):

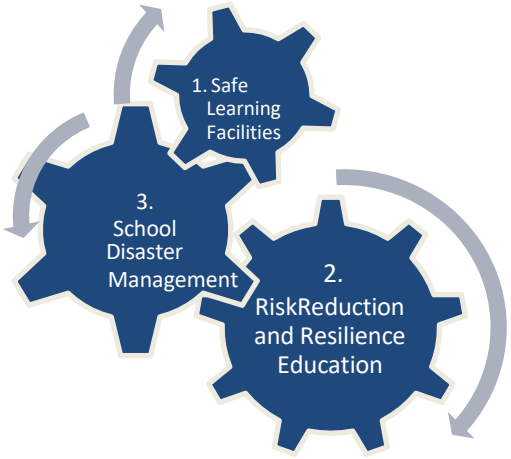


**Figure 1**. The Comprehensive School Safety Framework is supported by three pillars.

Increased knowledge to be aware of disaster preparedness can be done through socialization with the aim of educating, Sakurai,(2020). This is in line with the activities carried out by BPBD , that disaster awareness socialization is very important to reduce the impact when a disaster occurs.

## RESEARCH METHOD

### Location of Community Partnership Pogram of Disaster Mitigation

The Natural Disaster Mitigation community service area in Tiganderket District, Karo Regency, North Sumatra Province, is an area that often experiences cold lava floods. The area such as Kutambaru Village, Perbaji Village, Sukatendel Village are the cold lava impacted areas. Community service used to answer the partner's problems are; Library Research, observations, descriptive desk study tours, indoor education, Focus Group Discussion (FGD), field trip with the target audience is SMA N.1 students of Tiganderket sub-district, Karo Regency, North Sumatra Province (**Figure** 2.).

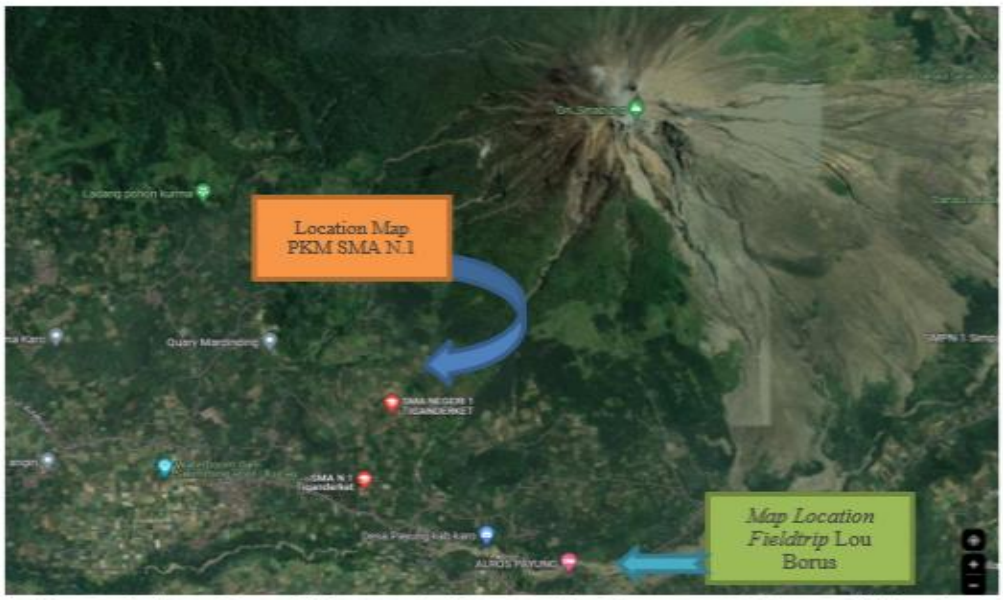


Figure 2. Location of Community Partnership Program – Disaster Mitigation of Tiganderket sub-district

https://www.google.com/maps/search/SMA+N.1+Tiganderket++.+Karo/@3.1442656,98.3448136,9158m/data=!3m1!1e3

The research method used is qualitative research, administrative preparation and literature study, "indoor" education (education) which is carried out by providing questionnaires, followed by explanation of theories about pollutant sources, lava flood environment aims to be able to provide insight and knowledge about disasters cold lava, resulting in a deeper understanding for the community about cold lava disasters and volcanic origins. The output is that the community is expected to be able to carry out geological communication, it is hoped that later they can input the extent of public knowledge in the form of cold lava disaster mitigation. Training (field education), field trips and observations to examine and describe sedimentary materials and landscape conditions of the Lao Borus river. The SMA N.1 education community group was represented (nature lovers, scouts) 45 people of Sukatendel village, aimed at providing the community with briefing, direct explanation of the cold lava flood disaster, (Sugiyono, 2015), explains where the research survey is a very important instrument.

The research instruments used are interviews conducted with respondents including: (a) knowledge of disaster mitigation; (b) knowledge of types of disasters; and (c) knowledge of cold lava flood disaster management procedures. The data collection technique in the study was taken from interview notes, according to Moleong (2010), who suggested that the data used are from interviews and documents in the field. Data collection aims to provide factual and realistic data that can explain the phenomenon of the research subject—analysis using qualitative data analysis techniques. The analytical technique in qualitative research uses ethnography carried out in natural conditions and factual findings in the field (Creswell, 2012), which states that data analysis is a continuous process that requires continuous data reflection.

## RESULTS AND DISCUSSION

### Knowledge of the Definition of Disaster Mitigation

Knowledge of the definition of disaster mitigation is grouped based on the tendency of respondents' answers. The following are respondents' answers regarding the term or definition of disaster mitigation as an effort to reduce or minimize disaster risks and impacts as illustrated in **Table 1**. From the results of the questionnaire that has been given, it is as follows:

**Table 1**. How to prepare disaster mitigation knowledge for students ?

| Respondents' Answers | Respondents' Answers Classification | Count | Percentage |
|---|---|---|---|
| **YES** | The term disaster mitigation is an effort to reduce or minimize the risk and impact of a disaster | 24 | 53,33% |
| | The term disaster mitigation refers to disaster management and prevention | 10 | 22,22% |
| | The term disaster mitigation refers to one's readiness in facing disasters | 2 | 4,44% |
| | The term disaster mitigation refers to efforts to overcome, reduce the risk and impact of disasters and the readiness of a person in facing disasters | 1 | 2,22% |
| | The term disaster mitigation as an agency to monitor or predict disasters | 1 | 2,22% |
| | Jawab ya, tapi tidak mengerti arti istilah mitigasi bencana | 1 | 2,22% |
| **NO** | Not yet and never heard of the term disaster mitigation | 3 | 6,76% |
| | do not know the definition of disaster mitigation | 2 | 4,44% |
| | Not yet looking into the term disaster mitigation | 1 | 2,22% |
| **Number of Respondents** | | 45 | 100% |

Based on Table 1 above, to find out the extent of respondents' knowledge about the definition of disaster mitigation, the respondents answered yes or no. The number of respondents who answered yes was 39 people, and the number of respondents who answered no was 6 people. Knowledge of students about the term disaster mitigation to minimize the risk and impact of disasters has been answered by 24 respondents with a percentage of 53.33%. Knowledge of the term disaster mitigation as disaster management and prevention was obtained by 10 respondents with a total of 22.22%. Knowledge of the term disaster mitigation as a person's readiness in dealing with disasters with a number of 2 respondents getting a percentage of 4.44%. One respondent answered the understanding of disaster mitigation as community preparedness in dealing with disasters, risk reduction, and disaster impacts, getting a percentage of 2.22%. Knowledge of disaster mitigation as an institution to monitor or predict disasters with 1 person getting a percentage of 2.22%. Respondents answered that they had heard the term disaster mitigation but did not understand it. There is 1 person (2.22%). The number of respondents who have never heard of the term disaster mitigation is 3 people (6.76%). Respondents who do not know the term disaster mitigation as many as 2 people (4.44%) of these students. While the respondents who answered that they had never heard of disaster mitigation were one person (2.22%).Based on the information described above, it can be seen that the knowledge of SMA N.1 Tiganderket students about the term disaster mitigation has mainly mentioned the definition

of disaster mitigation as an effort to reduce or minimize the risk and impact of disasters (Tuswadi and Hayashi, 2014). This shows that the knowledge of the term disaster mitigation from students is quite good. With this knowledge, students can analyze conceptual studies of disaster mitigation (Weichselgartner & Patrick, 2015) to transfer knowledge about disaster mitigation through the socialization process so that it can become one of the abilities of students and students in providing the concept of disaster mitigation in learning (Yustina & Kapsin 2017).

**Knowledge of Types of Disasters**

Respondents' knowledge about the types of disasters is natural and non-natural disasters. Natural disasters experienced by respondents were lahar floods, forest and land fires, earthquakes, tsunamis, landslides, and tornadoes. Meanwhile, non-natural disasters answered by respondents were covid-19. The following are the types of natural disasters and non-natural disasters answered by respondents:

**Table 2**. How to prepare knowledge of types of disasters for students and students?

| Respondents' Answers | Respondents' Answers Classification | Count | **Percentage** |
|---|---|---|---|
| **YES** | The types of disasters answered by the respondents were natural disasters and non-natural disasters. Natural disasters answered respondents were flood disasters, forest, and land fire disasters, earthquake disasters, tsunami disasters, landslides, tornado disasters. Meanwhile, non-natural disasters answered by respondents were covid-19 | 42 | 93,33% |
| **NO** | Does not provide answers regarding the type of disaster | 3 | 6,67% |
| Number of Respondents | | 45 | 100% |

Based on **Table 2** above, to find out the extent of the respondent's knowledge about the type of disaster with the respondent's answer yes or no. Yes, 42 people answered yes, with 93.33%, and 3 people did not answer with 6.6%.

From the aspect of knowledge about the types of disasters, it has been explained that the knowledge of SMA 1 Tiganderket students has mentioned various natural and non-natural disasters. The types of disasters in question are floods, forest and land fires, earthquakes, tsunamis, landslides, tornadoes, natural disasters, non-natural disasters, social disasters, covid-19 outbreaks, mountain disasters. eruptions, smog disasters, geological disasters, hydrometeorological disasters, droughts, hail, abrasion, and tidal waves. Knowing the types of disasters from SMA 1 Tiganderket students becomes the basis for learning about disaster mitigation (Asfani et al., 2016).

**Knowledge of Disaster Management Procedure**

The results of respondents on the knowledge of students about disaster management procedures are as follows:

**Table 3.** Respondents' Responses on Disaster Management Procedures

| Respondents' Answers | Respondents' Answers Classification | Count | **Percentage** |
|---|---|---|---|
| **YES** | Forest fire mitigation procedures | 1 | 2.22% |
| | Flood mitigation procedures | 32 | 71,11% |
| | Tsunami mitigation procedures | 1 | 2,22% |
| | Landslide mitigation procedures | 5 | 11,11% |
| | Covid-19 mitigation procedures | 2 | 4,50% |
| | Earthquake mitigation procedures | 1 | 2,22% |
| | Volcano mitigation procedures | 2 | 4,50% |
| **NO** | Not knowing disaster mitigation procedures | 1 | 2,22% |
| Number of Respondents | | 45 | 100% |

Based on **Table 3** above, to find out the extent of the respondent's knowledge of disaster mitigation knowledge about disaster management procedures with the respondent's answer yes or no. The number of yes answers is 44 people, and the answer is no 1 person. The knowledge of SMA 1 Tiganderket students about forest fire prevention procedures is 1 person with a percentage of 2.22%. Knowledge of lava flood mitigation procedures amounted to 32 people, with a percentage of 71.11%. Knowledge of tsunami disaster mitigation procedures is 1 person with a percentage of 2.22%. Knowledge of landslide mitigation procedures as many as 5 people with a percentage of 11.11%. Knowledge of COVID-19 disaster mitigation procedures amounted to 2 people with a percentage of 4.50%. Knowledge of earthquake mitigation procedures is 1 person, with a percentage of 2.22%. Knowledge of volcanic mitigation procedures is as much as 2 people with a percentage of 4.50%. While the number of respondents who do not and do not know disaster mitigation procedures are 1 person with a percentage of 2.22%.

Regarding the knowledge aspect, SMA 1 Tiganderket students who explained disaster management procedures had provided answers about various disaster management procedures. The classification of disaster management procedures from respondents' answers consists of disaster mitigation procedures for forest fires, floods, tsunamis, landslides, covid-19 disaster mitigation procedures, earthquake disaster mitigation procedures, and mountain mitigation procedures from fire respondents' answers. This proves that the students of SMA 1 Tiganderket are cognitively able to mention disaster management procedures. The disaster management procedure that is most often mentioned is lahar flood disaster management because most of the respondents live in the Mount Sinabung area. The knowledge of SMA 1 Tiganderket towards disaster mitigation, natural disaster, non-natural disaster, and social disaster is needed (Oktari et al., 2018). Disaster mitigation education is required to be implemented at school to make sure the readiness of the students facing the disasters (Metalin et al., 2020; Noviana et al., 2019; Hayudityas, 2020). Students must know about disaster preparedness and disaster mitigation to prepare preventive actions. The preparation of SMA 1 Tiganderket students needs to be done, namely by providing textbooks and teaching materials related to disaster mitigation content (Darmawan et al., 2020; Nouchi et al., 2015), preparing the teaching materials (Noviana et al. , 2020**), (**Hamed et al., 2014) for disaster mitigation (Rosmiati et al., 2020), given to the students. The knowledge about curriculum (Selvi, 2010), especially about mitigation education at school

should be implemented (Pambudi, 2018). Besides, the most important thing is to give the competency (Selvi, 2010), (Liakopoulou, 2011) to students, either improving their attitude or knowledge; and improving their ability degree or level of ability based on the judgment of others (Kawasaki et al., 2020); and characteristics possessed by students of SMA 1 Tiganderket (Prasertcharoensuk et al., 2015). So hopefully in the future, a prospective teacher must have a role in educating students to achieve their competencies. In addition, the facilitator must ensure that the quality of performance and good teaching performance is very important for students (Ridwan, 2019). The most important thing is the teacher's role is an essential essential factor for students to learn (Asfani et al., 2016).

## CONCLUSION

Knowledge of disaster mitigation for SMA 1 Tiganderket students is quite good as seen in (a) knowledge of the term disaster mitigation, SMA 1 Tiganderket students can understand the term disaster mitigation as an effort to reduce or minimize disaster risks and impacts; (b) knowledge of disaster mitigation regarding the types of disasters, students of SMA 1 Tiganderket can mention the types of disasters, both natural and non-natural disasters; and (c) knowledge of disaster mitigation on disaster management procedures, SMA 1 Tiganderket students can mention disaster management procedures. Disaster management procedures are mostly flood management procedures. Limitations in this study include not describing the teaching performance of disaster mitigation content by students of SMA 1 Tiganderket. Therefore, further research is about teaching about disaster mitigation content by students. The research implication is that the knowledge about mitigation of SMA 1 Tiganderket students is quite good; this can allow students to know about disaster mitigation, which can later be transferred back to students.

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