The Importance of Disaster Education, in Order to Increase the Preparedness of Elementary School Communities around Sinabung Volcano

Muzanii, Cahyadi Setiawan2, Warnadi3

123 Department of Educational Geography, Faculty of Social Science, Universitas Negeri Jakarta, Indonesia
Email: muzani@unj.ac.id

Abstract:
Lack of knowledge and understanding of hazards, vulnerabilities and suspected risks, causes people to tend to have low preparedness abilities in the face of disasters. Preparedness in facing disasters must be taught and trained from an early age through disaster education. Disaster education can be given since elementary school. The role of schools is very important in efforts to improve disaster preparedness. The learning community in a school consisting of principals, teachers, students, and other people in the school, must have knowledge and understanding of disaster risks in the school and the surrounding environment. The readiness of the learning community in the form of better knowledge and understanding is believed to reduce disaster risk. The purpose of this study is to describe the role of the learning community in elementary schools in increasing knowledge and understanding related to preparedness in facing Sinabung eruption. Field surveys and in-depth interviews are used as data collection methods which are then processed in the form of descriptions. The results showed that the school community had an important role in increasing preparedness for the Sinabung Vulcano eruption disaster. Comprehensive disaster education on disaster preparedness in the Sinabung Vulcano area still needs to be improved. Therefore, the final results of this study are expected to be a reference for disaster education around the volcano.

Keywords: disaster education, disaster preparedness, school communities, Sinabung Vulcano

I. INTRODUCTION

Indonesia is one of the countries in the world that has a high threat to disaster. Indonesia is a country located on the “Ring of the Pacific Fire” [1]. This condition is caused by Indonesia’s geological location which is at the confluence of three active plates namely: Indo-Australia, Eurasia, and the Pacific. The plate configuration results in Indonesia having a significant geological disaster threat; such as earthquakes, tsunamis, and volcanic eruptions. In addition to geological disasters, Indonesia also has a high level of vulnerability caused by hydro-climatological conditions which often cause floods and landslides. The National Disaster
Management Agency (BNPB) noted that during 2018, 2,564 disasters had occurred. This number is lower than 2017 which reached 2,862 disasters. However, the impact of last year's disaster caused more fatalities than the previous year [2].

![Figure 1. Indonesian Disasters 2003-2018](image)

The impact of a disaster varies greatly from loss, damage to death. BNPB has noted that during the period of 2015 to 2018 victims died due to the disaster reaching 4,780 people. This amount is quite large because it only occurred within 4 years (2015-2018) [2]. This condition shows the weakness of disaster preparedness in Indonesia. This is in accordance with the opinion of Rinaldi which states that Indonesia's readiness in dealing with disasters is still weak, as evidenced by the high number of casualties and losses in each disaster event [3].

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of casualties</th>
<th>Dies</th>
<th>Injuries</th>
<th>Refugees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>1.694</td>
<td>276</td>
<td>370</td>
<td>1.227,929</td>
</tr>
<tr>
<td>2016</td>
<td>2.306</td>
<td>578</td>
<td>2.675</td>
<td>3.162,491</td>
</tr>
<tr>
<td>2017</td>
<td>2.391</td>
<td>378</td>
<td>1.027</td>
<td>3.512,661</td>
</tr>
<tr>
<td>2018</td>
<td>1.999</td>
<td>3548</td>
<td>13.112</td>
<td>3.057,787</td>
</tr>
</tbody>
</table>

Source: BNPB [2]

At present, there are many natural disasters that threaten the lives, rights and needs of millions of children. Various kinds of natural disasters such as earthquakes, volcanic eruptions, tsunamis, typhoons and frequent floods have made people understand that children are the most vulnerable directly affected by these disasters. It is estimated that in the coming years, children who are vulnerable to disasters will continue to increase in line with the frequency and intensity of natural hazards to increase [4]. Therefore, disaster preparedness must also be a priority in the world of education in the world.
Indonesia, one of the countries that is very vulnerable to natural disasters, has made efforts to improve the resilience of its people to natural disasters. In the education sector, since the 2011-2012 academic year, the Ministry of Education and Culture has established and implemented a special disaster prevention education curriculum at all levels of school from elementary school (students aged 7-12 years) to high school (students aged 13-18 years). This policy has a direct aim to make children safer during disasters and to prepare them as agents of change who are able to spread knowledge to the larger community, especially for their own families [5]. Volcano eruption is one of the deadliest natural disasters that often occur in Indonesia, because this country contains more than 130 active volcanoes.

The eruption of Sinabung Volcano is a natural disaster with a significant impact. BNPB noted that until the end of 2018, losses due to the eruption of Sinabung Volcano in Karo Regency, North Sumatra reached Rp 1.49 trillion [2]. This number continues to increase because the eruption has not stopped until now. This large amount of loss is a total loss since the eruption occurred on 15 September 2013. These losses and damage cover productive economic sectors such as agriculture, plantations, livestock, trade, tourism, fisheries, small and medium businesses, and industries. The loss from the productive economy is estimated at more than Rp 896.64 billion. While the loss and damage in the residential sector is Rp 501 billion. Add to this the loss from damage to infrastructure of Rp. 23.65 billion, social losses of Rp. 53.43 billion, and cross-cutting Rp. 18.03 billion. These damages and losses do not include the effects caused by rain lava.

Sinabung Volcano continues to flare up after "sleeping" for hundreds of years. 2010 was the beginning of a series of Sinabung eruptions. Even since it erupted in September 2013, the 2,460-meter high volcano has never been calm. Landsat imagery and Geographic Information System (GIS) could be used to monitor the direction, pattern, and movement of pyroclastic materials [6]. Sinabung Volcano eruption has had significant impact. There are many plantation, forest, and settlement areas covered by pyroclastic materials of Sinabung [7].

II. URGENCY OF DISASTER EDUCATION

The disaster of the Sinabung eruption also affected school buildings. A total of 26,856 school buildings suffered from mild to severe damage. Losses incurred in schools including teachers and students, the learning process, property, and supplies due to the disaster, resulted in the future of many young people being threatened [8]. Cessation of education as a result of conflict and natural disasters is a major cause of the exclusion of children and young people from the educational pathway [9].

Noting the several disasters impacts that have been explained before, it needs real efforts in managing disaster risk in the Sinabung Volcano area. One way that can be used is disaster education. These efforts are in accordance with Law Number 24 of 2007 concerning Disaster Management and the Hyogo Framework for Action in 2005 that the priority of disaster risk reduction needs to be included in the education sector. Knowledge and understanding of
disasters will reduce the risk of disasters. This is due to the knowledge possessed will help in taking disaster mitigation actions.

Parties that play an important role in disaster education are learning communities. Community learning in schools consisting of teachers, students, and other devices must have the ability and preparedness in dealing with disasters. Preparedness in dealing with disasters will foster a culture of alert and safe in schools. Schools as education units have the responsibility to organize education, especially disaster preparedness. Until now, schools have remained trusted as an effective vehicle for building the nation's culture, including building a culture of citizen disaster preparedness; namely specifically to students, educators, education personnel, the surrounding environment and other stakeholders, and in general to the wider community [10].

Disaster education must start early. This is based on the fact that every year around 66 million children worldwide are affected by disasters [11]. Children have lower disaster vulnerability compared to adults. This happens because they have limited ability and resources to control or prepare themselves when they are afraid so they are very dependent on parties outside themselves so that they can recover from disaster [12][11]. Disaster education in primary and secondary schools helps children play an important role in saving lives and protecting community members [13]. Their main goal is to be able to save themselves and control themselves in order to avoid post-eruption trauma. The big goal of this disaster education is to be able to participate in providing education to the surrounding environment.

III. RESEARCH METHODS

This research uses survey methods and in-depth interviews, with a qualitative approach. Qualitative research aims to understand the phenomena about what is experienced by research subjects holistically, and by way of description in the form of words and language, in a special natural context and by utilizing various scientific methods [14]. In-depth interviews are used to gather detailed information from certain sources to determine the condition of the study area. Research subjects include: principals, teachers, parents, students, and the community around the school. The results of the interview are then reduced to obtain data exposure in accordance with the objectives of the study.

The survey was conducted at several locations that represented the entire research location in the entire disaster-prone area of Sinabung Vulcano. The survey site is located in Sukandebi Village, Naman Teran District, Tanah Karo Regency, North Sumatra, which is only six kilometers from Sinabung Vulcano. The village is now filled with volcanic ash and into the Sinabung Vulcano Prone Area. The reason for choosing this location is because the area of Sukandebi Village was one of the areas affected during the eruption of Sinabung Vulcano in 2016. There were several elementary schools that were badly damaged after the eruption of Sinabung Vulcano. Sukandebi Village Area until 2019 was an area prone to volcanic dust.
IV. RESULT AND DISCUSSION

The disaster management paradigm in Indonesia is still based on post-disaster or emergency response conditions [27]. Natural disaster management is still curative, and has not yet applied a preventive approach. The preventive approach to natural disaster management can begin with education. Education is expected to be a solution to prepare Indonesian people to have disaster preparedness.

Dariyo explains that education is a conscious and planned effort to create an atmosphere of learning and learning process so that students are actively able to develop their potential for themselves, the community, the nation and the state [15]. Furthermore, Umar and La Sulo (2005) in Dariyo, put forward the characteristics of the function of education in society as a process of transforming cultural values and the process of forming personality. Both of these educational functions must be instilled starting from the initial stages of student development [15].

Changes in the mindset of the community in dealing with disasters must be formed early, namely from school. Veverka (1994) in Sunarto; Talbot and Jakesman explained that motivation in community preparedness can be done using Maslow's hierarchy of needs [16][17][18]. Human motivation depends on how to meet needs based on the level of needs.

Based on community experience in dealing with disasters is largely determined by the cultural character and local community. For example, in the 2004 Aceh tsunami, the community has a very extraordinary struggle even with characters who do not easily trust other people [19]. Different conditions were found during the 2006 Bantul earthquake. The people affected by the 2006 Jogja Earthquake, developed more resigned and receptive attitudes. This attitude ultimately affects the growth of positive energy in post-traumatic development [19]. The characteristics of the people of Sukandebi Village are not much different from those in other regions that have been affected by disasters. Mutual cooperation in dealing with disasters is one of the attitudes reflected in the people of Sukandebi Village. This condition was reflected in the post-disaster rehabilitation and reconstruction process. Rijanta et al. states that in general the mutual cooperation system will experience a weakening under normal environmental conditions, but when disaster strikes the mutual assistance system finds its energy again [20]. Good community characteristics are expected to be passed on to young villagers / children. The process of informal and non-formal education in the community is an important key in disaster education. This becomes an important social capital in the development of an area in anticipating and reducing disaster risks.

There are 30 schools in eruption prone zone of Sinabung Vulcano [21]. The results of an interview with a grade VI teacher who teaches at Sukandebi Elementary School, namely Pak Rukun Sembiring, explained that as a parent who has children at the age of primary education he must be able and provide knowledge to his children about the eruption of Sinabung Vulcano in the Sukandebi Village area. Explanations can be given in the form of stories about
the 2016 Sinabung Volcano eruption that affected the region. Explanation through stories is a form of behavior that marks an event or in Javanese society known as "titen". Titen on Sinabung volcano behavior as its environment will give a good influence on the community [22].

Another perspective on emergency preparedness and response was stated by the Principal of SDN Sukandebi. The Principal of SDN Sukandebi said that the School had several policies related to the eruption and lava floods of the Merapi Volcano. One of the policies is to integrate the existing subjects. All instructors are instructed to integrate subjects that are taught with the topic of disaster, especially the Sinabung eruption disaster. The results showed that 80% of elementary school teachers in the Sinabung Volcano area had made efforts to integrate each subject with the Sinabung disaster topic. Damage at SDN Sukandebi during the eruption period of Sinabung Volcano is one of the evidences that the area of Sukandebi Village is a disaster-prone area. This condition requires that residents of SDN Sukandebi have good knowledge and understanding of the eruption of Sinabung Volcano. On the other hand, school residents, especially students, have high vulnerability to the Sinabung Volcano lava flood. This condition is inseparable from the damage to roads and bridges leading to school, so that if at any time a lava flood occurs, students cannot be evacuated.

![Image of Sinabung Volcano](image)

**Figure 1.** Lava from Sinabung Volcano carrying materials in all Sizes (photo: personal document)

Recognizing the signs of nature is one of the efforts to reduce the risk of disasters, especially lava floods. The school will stop school hours and send students home early if there are signs of rain. This is an anticipatory step that can be done by the school.

The forms of disaster management training have been owned by the village government. Training provided by the village government has not yet been fully adapted by the learning community, especially the Elementary School because the learning material is very complex. So, the preparation of material should focus on the study of the preparedness of school residents, especially students.
Referring to Kodijat and Rafliana, school-based disaster preparedness is all capabilities possessed by all school components to reduce the risk of disasters in the school environment [23]. Building preparedness through strengthening knowledge and attitudes, school policies and guidelines, implementation of emergency response plans and school early warning systems and the ability of schools to mobilize school resources in conditions before, during, and after a disaster are appropriate ways to reduce disaster risk in the environment school. Implementation of disaster education in schools can be realized today in the form of learning resources and teaching materials. Kodijat and Rafliana explained the parameters of knowledge and attitudes that schools must have (Table 2) in order to realize disaster preparedness schools [23].

<table>
<thead>
<tr>
<th>Questions</th>
<th>Description Purposes</th>
</tr>
</thead>
</table>
| What is that?             | • An understanding of the types, sources, and magnitude of hazards around the school environment  
                             • Understanding of the history of disasters around the school environment             
                             • Understanding of school vulnerabilities and capacities                              
                             • Understanding of the efforts that can be made                                          
                             • Behaviors and perspectives on disaster risk, vulnerability and capacity             |
| Why is it important?      | • Development of knowledge and attitudes of school residents towards disaster preparedness |
| What can the school do?   | • Formulating school policies to support the integration of knowledge in learning activities          
                             • Socialization, Simulation / Training in dealing with disasters                      
                             • Provision of facilities and infrastructure to reduce the risk of disasters such as warning boards, evacuation routes   
                             • Dissemination mechanism of information related to disasters                           |

Source: Kodijat and Rafliana (with modifications) [23]

In terms of fulfilling disaster education at the elementary school level, it must be adjusted to the level of age and level of cognitive development of students. According to the periodization of human development, elementary students are in middle childhood [15]. Peek explains that students in childhood are characterized by conditions that are psychologically vulnerable to disasters and have the possibility of post-disaster stress (post-traumatic stress) [24]. Students in this age range need support in the form of physical, social, mental, and emotional. In addition to requiring support, students must also be equipped with the ability to contribute to disaster preparedness, response and recovery.

Provisioning students' abilities and capacities in disaster preparedness can begin by focusing on the introduction of students' environmental conditions [25][24]. The introduction of

ISSN 1869-0489 (print)/ISSN 1869-2885 (online)  
© 2020 International Research Association for Talent Development and Excellence  
http://www.iratde.com
environmental conditions well is one form of recognition of the threat of disaster. This is explained by Mitchell et al. as follows [26]:
1) What hazards and disasters are in your environment?
2) What would you say to the environment around you (friends, parents, and teachers) about the disaster that happened to your area?
3) What will make you safe from the threat of danger and disaster?

The capacity in the form of preparedness in the school environment must also be possessed by the teacher. The teacher has a function as a facilitator of delivering information that supports school preparedness in facing disasters. As an effort to develop disaster preparedness in the scope of teachers, it can be started with training for teachers. The substance of the training material includes:
1) Teacher's knowledge and understanding of the environmental conditions of Sinabung Vulcano (hazards, vulnerabilities, and risks).
2) Understanding of disaster preparedness (knowledge and attitudes, school policies and guidelines, disaster early warning systems, disaster emergency response plans, and mobilization of school residents in the event of a disaster).

Current conditions indicate that the implementation of disaster education, especially for disaster-prone areas around the Sinabung vulcano, has not synergized properly between institutions to strengthen school capacity. Therefore, the capacity of schools, especially elementary schools, must always be improved. Increasing the capacity of primary schools in preparing for the eruption and lava floods of Sinabung Vulcano is an urgent interest.

Elementary schools in every village area should have a master plan / planning in disaster education. Disaster education in the school environment is expected to foster awareness and preparedness of students towards the surrounding environmental conditions. Awareness and good preparedness will foster a good attitude of empathy in students.

V. CONCLUSION

The results of this study indicate that disaster education is important in disaster management, especially for the natural disaster of Sinabung Vulcano. Disaster education can be done in the formal sector / education in schools, informal / education in the family, and non-formal / education in the community. The main stream of disaster education is within the responsibilities of formal education. Disaster education at the elementary school level can be given in social science learning and local content. Formal education that began in elementary school is believed to be able to shape the character of students who have good disaster preparedness against the threat of eruption and lava floods in Sinabung Vulcano. Forms of disaster education such as the introduction of vulnerabilities, hazards and risks must be provided from the beginning. Knowledge and understanding of vulnerabilities, hazards, and risks not only need to be mastered by students but also all school members. This is because vulnerability in the school environment lies not only in students, but also all school residents.

ISSN 1869-0489 (print)/ISSN 1869-2885 (online)
©2020 International Research Association for Talent Development and Excellence
http://www.iratde.com
REFERENCES


