

Implementation of Disaster Mitigation Education in Karo Regency, North Sumatra as an Effort to Build Disaster Alert Character

Yogi Ambarita¹, Darsiharjo², Mamat Ruhimat³
{yogiambarita@upi.edu¹}

^{1,2,3}Geography Education Study Program, Indonesian University of Education, Indonesia

Abstract. This study aims to form students' alert character to face volcanic disasters. The method used in this research is the study of literature. Karo Regency is a disaster-prone area, which is the eruption of the Mount Sinabung volcano. The most effective prevention efforts to reduce the impact of disaster risk are from the education sector. The school is a conscious and planned effort developing student character through the cultivation of knowledge and skills. Disaster mitigation education is an essential need for students to reduce the impact of natural disasters both in the present and in the future. Nowadays, disaster education materials have been studied at schools in Indonesia. Although students have been taught several ways to cope with natural disasters, they still have a lack of awareness. The results obtained from this study are some efforts to foster the character of the students' disaster preparedness. So it is hoped that students can implement disaster mitigation education to reduce the number of fatalities.

Keywords: Volcanic disasters, education, students, schools, characters.

1 Introduction

Education is the effort done by the community to develop a whole people by increasing the quality of education that is meaningful and developing. Education is received by someone in childhood that will affect future life. It can be achieved through the learning process [1]. The learning process is a teaching activity carried out by the teacher and learning activities carried out by students. The learning process is said to be effective if the planning prepared can be achieved properly [2]. Learning is a complex activity. After learning, people have skills, knowledge, attitudes, and values. From this understanding, there are three main attributes or main characteristics of learning, namely: process, behavior, and experience.

Geography is a science that can support lifelong life and encourage the improvement of life. Fields of study of geography include the earth, aspects, and processes that shape it, human's causal and spatial relationships with the environment, as well as human interactions with their homes. Geography for life. National Geography Standard, states that Geography is an integrated scientific

discipline in the study of social sciences and physical sciences, which enables students to apply geography knowledge and skills to various life situations at home, work environment or community [3].

As an integrative discipline, geography combines the dimensions of physical nature with the human dimension in examining human existence and life in its place and environment. This is a strong reason to make geography an important branch of science for the community to learn during the educational process. One of the important materials learned in geography at the high school level is natural disaster mitigation and adaptation material. Schools have a strategic role in educating and providing disaster mitigation materials early on, starting from elementary, junior high and high school levels. Disaster mitigation socialization efforts will be very effective if it is carried out through schooling [4]. Students in high school Geography learning are directed, guided, and helped become Indonesian citizens and good global citizens in a dynamic constellation of the global society.

This subject is designed to build and reflect the ability of students in the life of a community that always develops continuously. Awareness of actions dealing with disasters is related to human behavior and actions to develop themselves, society, nation, and the environment. The main factors which can cause many casualties and large losses in disaster, namely the lack of understanding of the characteristics of hazards, attitudes or behaviors that result decreasing of natural resources, lack of early warning information that results in unpreparedness, and the powerlessness or inability to deal with disasters [5]. Preparedness is grouped into four parameters namely knowledge and attitudes, emergency planning, warning systems and resource mobilization [6].

Knowledge is a major factor and is the key to preparedness. The knowledge usually influences attitudes and concerns about have disaster preparedness. Preparedness is a part of the disaster management process and in the current evolving concept of disaster, the importance of preparedness is one of the important elements of pro-active disaster and risk reduction prevention activities before a disaster occurs [6]. Disasters are a series of events that threaten and disrupt people's lives, whether they are caused by natural or non-natural factors or human factors, resulting in casualties, environmental damage, property losses and psychological impacts [7]. The most recent natural disaster in several regions in Indonesia is the eruption of Merapi and according to the data, Indonesia also has 129 active volcanoes or about 13% of active volcanoes in the world. All volcanoes on the tectonic track extending from Sumatera Island, Java, Nusa Tenggara, Banda Island, Halmahera, and Sangir Talaud Islands which occupy one-sixth of the archipelago's land area. The number of volcanoes in Indonesia due to a confluence of three giant tectonic plates, namely the Pacific plate, Australia and Eurasia. In the area along the line, the meeting is known as the Pacific Ring of Fire.

Mount Sinabung as an altitude of 2460 masl., located in the Karo plateau at a geographical position 3° 10' North and 98° 23.5' East. The location of Mount Sinabung was included in the Tanah Karo Regency, North Sumatra. Initially, this volcano was classified as type B classification because the volcano had no eruption history since 1600. On August 29th, 2010, Mount Sinabung erupted. This event was a type of volcano B which is the first to erupt. Therefore, the classification has changed to type A, a volcano that has erupted since 1600 until now [8]. On August 29th, 2010, Mount Sinabung issued lava so that its status was raised to the highest level of Awas, 12,000 residents around it was evacuated to 8 locations. One person is reported to have died of respiratory

problems due to the eruption of Mount Sinabung. Mount Sinabung continued to experience an eruption that released volcanic ash until the last occurred on Monday, February 19th, 2018, which caused many areas near the Mount Sinabung covered with volcanic ash and disrupted the activities of the learning process in the Tanah Karo area.

As a result of the eruption of Mount Sinabung, students have very disturbing learning activities at school. Students feel uncomfortable when a hot cloud of the mount unpredictably comes. Materials from volcanic ash eruption of Mount Sinabung covered several schools, including SMAN 1 Simpang Empat District, SMPN 2 Gurukinayan Payung District, SMPN 1 Gamber Simpang Empat District, SD 040486 Gurukinayan Payung District, SD 040474 Tiga Serangkai, SD Negeri 046416 Berastepu, SD SD4 Gamber Negeri 048001 Kuta Tonggal, and Public Elementary School 047175 Simacem, Namantan District.

Based on the volcano disaster which is prone to occur in Karo District, North Sumatera, serious handling from various parties is needed. A pragmatic strategy in forming a community is important to know as awareness of the dangers of volcanic disasters. One strategic step that can be taken is through the education sector. The education sector is very fundamental in shaping the character of students. Through the education sector, knowledge about disaster mitigation can be given intensively by educators. Disaster education is one of the efforts to increase the capacity of students' knowledge about disasters regarding the definition of the disaster itself, types of disaster events, signs of a disaster occurrence, the impact of disasters, pre-disaster efforts, when disasters, post-disaster, disaster risk reduction efforts and the vulnerability of disasters in the region [10]. Disaster mitigation education taught in schools will shape the character of students who are prepared to be alert for any disasters that occur. Disaster prepared character will be formed if students have the provision in terms of disaster mitigation knowledge and skills that can be embedded in the school environment in Indonesia both in learning and extracurricular activities. The problem is how to implement mitigation education to form disaster alert character in Karo District High School students.

2 Research methods

The research method used in this research is a qualitative descriptive method using the analysis of literature studies. The subjects in this study were Karo Regency High School, students. Writing this paper uses secondary data sourced from agencies and institutions related to the disaster. Literature study and secondary data are then analyzed by the author to form a paper in the field of disaster mitigation education that can be implemented in schools in Karo District.

3 Results and discussion

The Sinabung volcano is a cone-shaped stratovolcano, with a peak height of 2460 meters above sea level. The location of the Sinabung volcano is administratively entered into the Karo District, North Sumatra Province. Geographically, it is located at position 3° 10' North Latitude and 98° 23.5' East Longitude. At the foot of Mount Sinabung, there is a lake, namely Lake Lau Kawar with an area of approximately 200 hectares, located in the village of Kuta Gugung. Lau Kawar is also one of two lakes in the Leuser ecosystem.

Geologically, the Sinabung volcano arises because of the uplift (orogenesis) followed by the volcanic process in the form of the eruption of the Quarter Volcano which is more effusive. The

Mount Sinabung landscape is part of the Berastagi plateau (Berastagi High Lands) which is bordered to the south by the Kabanjahe plateau (Kabanjahe Plateau) [13]. This landscape is still part of the Bukit Barisan Timur Mountains. On August 29th, 2010, Mount Sinabung issued lava so that its status was raised to the highest level of Awas. There were 12 thousand residents around it were evacuated to 8 locations. One person was died because of respiratory problems caused by the eruption of Mount Sinabung. On September 7th, 2010, Mount Sinabung had the most dangerous eruption. Mount Sinabung spewed volcanic ash to a height of 5,000 meters in the air. The sound of the eruption was heard up to 8 kilometers away.

Mount Sinabung also had subsided for two years, and Mount Sinabung erupted again in 2013. Four eruptions occurred twice each on 15 September and 17 September. This eruption spewed volcanic ash into the air where ash rain reached the Sibolangit and Berastagi regions. The materials thrown into the atmosphere during volcanic eruptions were gas and volcanic materials [11]. Besides emissions of volcanic, eruptions also emit halogen gases such as HCl and HF which strengthen acid deposition [12]. The eruption of Mount Sinabung causes some agricultural problems that experienced crop failure or damage especially in the area of the foot of Mount Sinabung and Berastagi.

At least during November 2013, Mount Sinabung repeatedly erupted and sprayed hot clouds. On November 24th, 2013, Mount Sinabung was upgraded to Awas. As a result, residents of 21 villages and 2 hamlets were evacuated. This condition persisted until entering early 2014. A series of eruptions and bursts of hot clouds caused the number of refugees to increase by around 20 thousand people. The condition of Sinabung began to subside in January 2014. However, there were 14 victims of the eruption mount Sinabung who died while visiting Desa Suka Meriah, Payung, Karo which were in danger zone I. On May 21st, 2016, Mount Sinabung erupted again. A burst of hot clouds covered Gamber village, which was only 4 kilometers away from Mount Sinabung. There were 7 people died and 2 others were suffered burns in the incident. They were at the Gamber village when the eruption occurred.

Throughout 2017, Mount Sinabung continued to emit hot clouds. As a result of thousands of people who suffered from the eruption of Mount Sinabung had to stay in refugee camps. In May 2017, Mount Sinabung status became Awas marked the eruption and hot clouds glide. Bursts of material from this eruption reached as high as 4 kilometers. The eruption occurred again on Wednesday, August 2nd, 2017. The eruption occurred at 10:00 WIB with a column height of 4,200 m accompanied by a slide of hot clouds falling as far as 4,500 m to the Southeast-East. As a result of the eruption that almost happened every day, there were 7,214 people or 2,038 families displaced in 8 refugee camps.

At the end of December 2017, Mount Sinabung erupted again by spraying hot clouds as far as 4.6 kilometers. In 2013, Mount Sinabung erupted continuously until Monday, February 19th, 2018, which made the citizens panic. Moreover, the learning activities at school were disturbed, because students felt uncomfortable in the learning process because of the sudden cloud of heat. Material from volcanic ash eruption of Mount Sinabung covered several schools, including SMAN 1 Simpang Empat District, SMPN 2 Gurukinayan Payung District, SMPN 1 Gamber Simpang Empat District, SD 040486 Gurukinayan Payung District, SD 040474 Tiga Serangkai, SD Negeri 046416 Berastepu, SD SD4 Gamber Negeri 048001 Kuta Tonggal, and Public Elementary School 047175 Simacem, Namanteran District. The picture below shows that many people were panic because of the eruption of Mount Sinabung.

Education is one of the most essential sectors in building the character of the young generation. One of the essential sectors in Indonesian education is the provision of subject matter relating to disaster mitigation. Article 1 number 9 of the Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management defines mitigation is a series of efforts to reduce the risk of disaster, both through physical development and awareness and increase the ability to face the threat of disaster. Disaster mitigation education is one of the efforts to increase students' knowledge capacity about disasters, types of disaster events, signs of disasters, disaster impacts, pre-disaster efforts-when disasters, post-disaster efforts, efforts to reduce disaster risk and vulnerability and vulnerability disaster in his area.

Disaster mitigation education is very important especially to reduce the number of fatalities. The implementation of disaster mitigation education in schools can be done by implementing disaster mitigation material in geography subjects and through extracurricular activities held at the school. According to Regulation of the Minister of Education and Culture No.62 of 2014 Article 1, extracurricular activities are curricular activities carried out by students outside of hours of learning extracurricular activities and curricular activities, under the guidance and supervision of the education unit. Extracurricular activities are held to develop the potential, talents, interests, abilities, personalities, cooperation, and independence of learners optimally to support the achievement of national education goals. Extracurricular activities consist of mandatory extracurricular activities and selected extracurricular activities [9].

Disaster mitigation education materials can be taught on Geography subjects. The second implementation is in extracurricular activities. Both of these are the most efficient and effective way of fostering the alert character of students toward Volcano disaster. In geography, students are taught about why Karo District is a disaster-prone region, what causes it and how to overcome these problems. This can be explained to students by the principles of geography and its concepts as well as the teacher can teach disaster mitigation measures. Then, students can also identify the disaster-prone area. Moreover, by knowing the area spatially, students will be able to determine the right steps in dealing with natural disasters.

Extracurricular activities are activities that aim to develop potential interests and talents beyond the students' academic abilities. Extracurricular activities can also be used as an implementation in providing character building for disaster preparedness students. Extracurricular activities that can support the formation of such characters such as training activities from Basarnas, simulation activities for Disaster Mitigation that can work together with BPBD from school and counseling activities on disaster mitigation education. The training that is held in extracurricular activities can help students improve their skills in dealing with disasters so that with these skills it is expected that during a disaster can minimize the number of fatalities.

4 Conclusion

Disasters are a series of events that threaten and disrupt people's lives, whether they are caused by natural or non-natural factors or human factors, resulting in casualties, environmental damage, property losses, and psychological impacts. Karo Regency is a disaster-prone area due to various factors, including those in the Karo Regency which have active volcanoes such as Sibayak Volcano and Sinabung volcano which are currently experiencing eruptions. Disaster mitigation

education needs to be given to students to form a character that is alert to disasters. Mitigation is a series of efforts to reduce the risk of disasters, both through physical development and awareness-raising and capacity to face the threat of disaster. According to the 1945 Constitution Article 1 states that "Every citizen has the right to education".

Disaster mitigation education can be given to students through learning activities and extracurricular activities. In learning activities, the material on disaster mitigation is implemented into Geography subjects. Disaster mitigation education can also be integrated into extracurricular activities at the school. Besides that, activities can also be carried out such as disaster simulation activities, SAR training activities, counseling activities about disasters and so on. Through these activities, efforts to grow the character of disaster preparedness students will be effective. So it is hoped that students can implement disaster mitigation education to reduce the number of fatalities.

References

- [1] O. Hamalik, *Kurikulum dan Pembelajaran*. Jakarta: Sinar Grafika, 2008.
- [2] Dimiyati, *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta, 2009.
- [3] E. Maryani, *Pendidikan Geografi*. Bandung: Fakultas Ilmu Pendidikan, Universitas Pendidikan Indonesia., 2007.
- [4] T. Bahtiar, *Bencana Mengintai dari Balik Keelokan Tatar Sunda*. Bandung: Badan Geologi., 2013.
- [5] BAKORNAS, *Pengenalan Karakteristik Bencana dan Upaya Mitigasinya di Indonesia*. Bandung: Direktorat Mitigasi Lahar., 2007.
- [6] LIPI, *Kajian Kesiapsiagaan masyarakat dalam Menghadapi Ancaman Bencana Alam*. Jakarta: UI Press, 2006.
- [7] Bakornas, *Undang undang No 24 tahun 2007 tentang Penanggulangan Bencana*. Jakarta: Bakornas, 2007.
- [8] S. R. Wittiri, "Gunung Sinabung Naik Kelas," *War. Geol.*, vol. 5, no. 3, 2010.
- [9] S. Mardiyati, *Dasi Sigab (Dalang Siswa Siap Siaga Bencana): Model Pendidikan Kebencanaan Sebagai Ekstrakurikuler Berbasis Kearifan Lokal Di Daerah Rawan Bencana Di Indonesia*. Semarang: Unnes, 2017.