



KNOWLEDGE OF VOLCANIC DISASTER MANAGEMENT EFFORTS TOWARDS A DISASTER RESILIENT COMMUNITY

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Abstract:

Volcanic eruptions are natural disasters that have a wide impact on the affected area. Losses due to volcanic eruptions are not small. By making disaster hazard maps in areas with the potential for volcanic eruptions to occur, the threat of volcanic eruptions can be minimized. Volcanic areas are areas with high availability of resources. Volcanic activity can produce materials that enrich and rejuvenate agricultural soil. The tall bodies of volcanoes are rain collectors, stores and suppliers of groundwater. Volcanic areas are generally dense and densely populated, because the availability of natural resources is the main attraction for the population. Volcanic eruptions, on the other hand, can cause different types of damage. Knowledge about the dangers of volcanoes and their eruptions is needed for the community, this aims as a form of tough resilience in the face of volcanic eruptions. Disasteraware society has the main goal of reducing the risk of disaster victims, this is because Indonesia is a disaster supermarket which includes geological disasters, climatological disasters, social disasters, technological failure disasters and biological disasters in the form of viruses.

Keywords: *Volcanoes, Knowledge, Disaster Resilient Communities*

INTRODUCTION

Indonesia is called an archipelagic country which has various active volcanoes in the world. Indonesia's volcanic activity can be seen from its geographical location which is at the intersection of three tectonic plates, namely the Eurasian Plate, the West Pacific Plate, and the Australia-India Plate. Judging from its geographical location, Indonesia is located in a series of volcanoes in the Pacific plate area, which is the intersection of two mountain roads, including the Mediterranean Ring and the Pacific Ring. The Indonesian Mediterranean Ring Line stretches from Java, Sumatra, Maluku, Nusa Tenggara and Bali, while the Pacific Rim Line can enter Indonesia through the Sulawesi region and then has branches up to Halmahera, finally arriving in the Papua region (etd.repository.ugm.ac.id, 2016). Under these conditions, the country of Indonesia has many active volcanoes and seismic zones.

Indonesia itself has 80 out of 129 active volcanoes which can be seen and observed all the time. According to Sadisun, in Indonesia there are 500 active volcanoes in the world and have an average of 50 eruptions per year. A volcanic disaster is an event caused by a volcanic eruption which releases substances from a volcanic mountain such as lava, hot incandescent rock, volcanic ash, and toxic gases. Volcanic disasters are divided into primary disasters and secondary disasters according to their occurrence. The primary hazard is the hazard that occurs during a volcanic eruption. For example throwing incandescent stones, hot clouds, ash rain, lava, and gases that have poison (Hermanto, T. I., & Muhyidin, 2021). Secondary disasters are disasters that occur after the eruption process. For example, there is a deposit of volcanic

material at the top of an uphill slope. When the rainy season comes, the material will be carried down into the valley by rainwater, causing very large and fast landslides.

The number of volcanoes in Indonesia has resulted in Indonesia having a negative impact due to volcanic eruptions. One example is that there are two types of lava floods, namely cold lava floods and hot lava floods. Hot lava flood is an obstacle and threat of a disaster that causes a volcanic eruption in the form of volcanic material. For example, molten magma in the form of hot rocks and mud rocks. Whereas cold lava floods are a threat to lava floods caused by volcanic material that pushes material through the watershed in the form of erupted mud due to rainfall factors (Bencana, 2017).

Not only that besides having a negative impact, Indonesia also has a positive impact from the many volcanoes so that this positive impact makes the soil in Indonesia very fertile so that agricultural production increases and some volcanic materials can be used for community building needs, and the charm of volcanoes in Indonesia also save a lot of profit that can increase income around the area. So that there is a need for volcano disaster mitigation to reduce disaster risks in the form of loss to the community's economy, damage to surrounding natural resources, and the emergence of casualties which will form the basis of a development plan in Indonesia. It is necessary to increase the awareness of the population in dealing with and overcoming the risks and impacts of volcanic disasters so that residents can live a prosperous and safe life from disasters (Badri, M., & Hubeis, 2008).

RESEARCH METHODS

This research uses the literature study method, namely data collection techniques and facts from various sources (Albi, 2018). The data and facts from this article were obtained from sources whose credibility can be accounted for because they come from journals, national online news sites and government websites.

RESULTS AND DISCUSSION

Volcanic Disaster Events in Indonesia

A volcano which in English is called vulcano is a word that has a definition as a channel for channeling panna liquid (melting or what is called lava). This lava can reach a depth of about 10 kilometers to the earth's surface. Sediment from the accumulation of volcanic material that can come out during an eruption. Volcanoes are a form of natural destruction that occurs in the crust of celestial bodies such as Earth. The fault spewed hot lava, ash and gas from the magma chamber which is below the earth's surface. There are many ways to find out based on the type or form of activity. There are active activities, some are dead, some are inactive (etd.repository.ugm.ac.id, 2016). Depending on the type of shape, there are conical mountains.

Namun kebenaran catatan tersebut belum dapat dipastikan karena masih banyak kekurangan dalam penulisan laporan tersebut, seperti lokasi dan waktu letusan yang tidak tepat. Menurut laporan PVMBG, Indonesia memiliki 127 gunung berapi aktif. Jumlah ini menjadikan Indonesia Negara dengan gunung berapi paling aktif di dunia. Dari 127 green, 69 dimonitor oleh PVMBG. Beberapa gunung berapi terkenal dengan letusannya, seperti Krak dan yang berdampak global pada tahun 1883. Ada juga supervolcano Danau Toba yang diperkirakan terjadi pada rata-rata 74.000 tahun lalu dan menyebabkan selama 6 tahun lamanya mengalami musim dingin, dan Gunung Tambora juga tercatat sebagai dasyatnya letusan gunung berapi yang terjadi pada tahun 1815 silam (Khambali, I., & ST, 2017).

Negative Impact of Volcano Disaster

Loss of some or a lot of germplasm and changes in plant biodiversity.

Various crops are affected. This is not the same as a volcanic eruption. There are some plants that are not traversed by mountain smoke 2, so that the surrounding vegetation is not damaged, and the surrounding area is crossed by damaged hot clouds. Local biodiversity is often destroyed by volcanic eruptions. However, local diversity can

be increased through amendments and planting pioneer plants that can save various other plants from growing, and planting communities will improve natural habitat conditions (Sopacua, Y., & Salakay, 2020). However, restoration of dominant colonies will alter biodiversity by altering plant species and decreasing diversity. The response of member ecosystems to volcanic eruptions varies according to the type, scale, frequency and degree of damage caused by eruptive events, and the vegetation affected by natural and other factors (Wood and Morris, 2016).

Effects of incident eruptions The pyroclastic materials and volcanic ash used depend on scale, damage to biota and intensity. Presence Forests are generally better able to withstand eruptions than croplands or grasslands because the high diversity of forests allows many individual plants to survive. Land restoration efforts can be accelerated by spreading fast-growing seeds such as Mount Lamtoro and planting more mature plants. Plants that grow mixed varieties will have superior biodiversity and have a mutually beneficial relationship. However, the development of a natural environment will not be equated with the state of biodiversity before the volcanic eruption.

Disappearance of waterways, closing of water and even water catchment areas and destruction of forests around the mountain.

The loss of this water from the cover of volcanic material causes changes in irrigation patterns. This damage is caused by lenses on water sources and waterways, such as loss or displacement of springs, volcanic material that fills up rivers, river (river) sedimentation can cause a greater risk of cold lava in upstream coastal villages. Deforestation due to volcanic eruptions can lead to a decrease in the functioning of the water catchment area, whether we like it or not it can cause problems for the preservation of springs. Forestry Planting trees, especially in the area around Mount Merapi, is an effort to restore the function of the watershed. Reforestation can be done by planting trees that are highly adapted to sandy soils, such as acacia, eucalyptus and pine trees. The benefits from water harvesting are also restored because the risk of soil erosion is reduced (Badri, M., & Hubeis, 2008).

The destruction of the surrounding land and the resulting effects of cold lava floods is a lava dome formed from the accumulation of volcanic material at the top of the mountain during an eruption, which can slide at any time if it rains. One. If the lava flows, then the big rocks are easily carried away by the cold lava flow. It can hit the river bank and can wash away everything caused by the cold lava flow. The flow of cold lava can cause land damage due to scouring and the development of agricultural lands in its path.

Soil is buried and soil formation is hampered by repeated volcanic eruptions. Another material from volcanic eruptions is lava. Lava is a material that carries air and is known as cold lava. This material carried is mud, volcanic ash and fine rock, which is transported by water through the explosive material at the top to the bottom.

The loss of access from agricultural land and land tenure limits around land damage due to volcanic eruptions has various variations, including the thickness of the volcanic material that covers the land. The eruption and the thick coating of volcanic material covered with lava resulted in the absence and disappearance of restrictions on land ownership, especially those along the river where people live. This is useful for state land agencies as well as landowners to determine the boundaries of their land (Disaster, 2017). Re-mapping is needed to secure land certificates, especially government-owned and community-owned areas. The government and community landowners are stakeholders in remapping and re-measuring landowners. Mapping is a solution to help use areas in areas affected by volcanic eruptions and cold lava.

Volcanic ash from volcanic eruptions causes health problems in that many volcanic eruptions will carry small, very fine ash grains that can enter the lungs when we take a breath. If the eruption area has these ash grains, then healthy people will suffer from dyspnea with any irritation and mild cough. Eye irritation is one of the impacts caused by the effects of volcanic eruptions (Khambali, I., & ST, 2017). This is caused by the presence of particles or grains of volcanic soil which can damage the cornea of the eye and are sharp so that it will cause our eyes to turn red. When wearing

contact lenses should be removed to prevent damage to the cornea of the eye.

Danger of Volcanic Eruption

The existence of a volcano will have a direct impact which is called the primary impact and indirectly which is called the secondary which is a hazard that attacks the lives of the surrounding community. The immediate hazards of a volcanic eruption are:

Leaking Lava, this lava runoff is in the form of hot, liquid and viscous lava that can collapse all the buildings in its path. The acceleration of the rate of this lava depends on the thickness of the magma, the lower the viscosity, the farther it will flow. The temperature when the lava erupts is between 8000-12000 C. In general, in Indonesia, lava flows from volcanic eruptions, and magma is of medium weight, so the movement is rather slow so that people can avoid the impact..

Pyroclastic or pyroclastic flows, namely hot cloud flows, may be due to the collapse of the plumes produced by the Pliny eruption, these eruptions can only originate in one direction and erode flows, lava domes and tongues. Pyroclastic flows are controlled by gravity and generally flow through lowlands or valleys. The high shift of hot cloud flow is caused by the release of gases from magma or lava, namely the release of hot air when it flows. The flow speed can reach 150-250 km/hour, and the flow range can reach tens of kilometers even when moving in water/sea. Hot clouds are liquid, and high temperatures can be dangerous for residents around the volcano.

A shower of hot clouds can occur in the huge plume of smoke from an eruption, and when the energy released is used up, the ash can scatter in many directions and fall back to Earth again. Rain clouds do not pose an immediate danger to humans, but ash deposits can knock down leaves and small trees, which can damage agricultural land, and reach thicknesses at certain relative levels that can knock down roofs. Ash scattered in the air will temporarily blacken the planet and pose a danger to air traffic users. Ash rain can cause damage to houses, disrupt the respiratory system and can endanger air traffic users, namely airplanes.

The eruption of this lava can occur in volcanoes that are located close to crater lakes. If at the time the volume in the crater reaches a large point it will threaten the surrounding land which can generate very hot mud.

Volcanic gas or so-called toxic gas is usually found in active volcanoes in the form of SO₂, H₂S, HCN, CO, CO₂, etc. which occur above the limit that can kill humans. The carbon dioxide gas released by Mount Dion killed everyone around.

The following are secondary hazards that occur after a volcano erupts: a) Lava rains which occur when loose material from a volcanic eruption is deposited on the tops and slopes of a mountain, transported by rain or surface water. This lava flow is a very concentrated mud flow, so it can transport materials of all sizes. Large boulders with a diameter of more than 5 m can float in these mudflows. Lahars can also change terrain and damage infrastructure along rivers. b) Flash floods can occur as a cause of water saturation or high rainfall which results in the erosion of old volcanic material on the slopes of volcanoes. The flow of mud here is not as thick as lava, but a sudden burst of mud can be quite dangerous for residents who work on the river. c) Volcanic avalanches, volcanic eruptions, steam explosions, brittle and brittle rocks in the body of a volcano, or are affected by a strong earthquake, volcanic avalanches may occur. Volcanoes are generally rare with volcanic avalanches erupting, so the hazardous area map does not include the hazard posed by volcanic avalanches.

Volcano Disaster Management Efforts

Volcano disaster management must be necessary to avoid losses due to volcanic eruptions. Disasters are a common test that humanity faces, including volcanoes. Efforts that can be made to overcome the impact of volcanic hazards are mitigation efforts, including changing the order areas that experience disaster mitigation (Umam, 2019). In spatial planning, it must provide protection against the threat of eruptions and damage to the surrounding nature or the environment that affects volcanic mountain resources. Efforts to mitigate volcanic eruptions must be implemented early on, namely by strengthening and outreach to communities around volcanoes. Volcanic

eruptions and volcanic activity are at a critical starting point. disaster. Disaster management for volcanic eruptions is divided into three parts, namely preparation before eruption, preparation during eruption and preparation after eruption.

CONCLUSION

Indonesia is a country that has many islands and active volcanoes. Geographically, Indonesia is located in the Pacific volcanic chain, which is the intersection of two mountain roads, including the Mediterranean Ring and the Pacific Ring (etd.repository.ug.ac.id, 2016). Under these conditions, Indonesia has an active seismic zone and many volcanoes. Indonesia itself has 80 of 129 active volcanoes which are continuously observed and monitored. Broadly speaking, there are 500 volcanoes in the world, with an average of 50 eruptions each year, the loss of some or most of the germplasm resources, and changes in plant biodiversity. Various crops are affected, ranging from volcanic eruptions. There are plants that are not penetrated by the eruption smoke, so that the surrounding vegetation is not damaged, and the surrounding areas are penetrated by damaged hot clouds. The response of member ecosystems to volcanic eruptions varies according to the type, scale, frequency and degree of damage caused by eruptive events, and vegetation affected by natural and other factors.

Damage to water sources and streams was caused by eruptions that caused the loss or displacement of springs, volcanic material that silted up rivers. In some eruptions, ash grains are so fine that they can enter our lungs when we breathe. Volcanic hazard management is necessary to avoid losses due to volcanic eruptions.

Disasters are a common test that humanity faces, including volcanoes (Badri, M., & Hubeis, 2008). Efforts to overcome the impact of volcanic hazards are mitigation efforts, including changing the spatial arrangement of an area according to disaster management measures. Spatial planning must provide a sense of security against the threat of eruptions and environmental damage affecting volcanic resources. Mitigation efforts can be carried out by strengthening community capacity through mandatory disaster management training activities and the establishment of an early warning system to monitor lava and volcanic activity at vulnerable points.

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