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MOUNT SINABUNG DISASTER MITIGATION CHALLENGES AND STRATEGIES TO IMPROVE COMMUNITY SUSTAINABILITY

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ABSTRACT

This research aims to study how disaster mitigation challenges and strategies by governments in employment improve community sustainability. This type of research is qualitative. Data collection techniques use interview guidelines. Data processing and analysis are carried out with stages of data reduction, data presentation and conclusion-making, and then the data is analyzed qualitatively. The results of this study suggest that the main challenges and constraints in current disaster mitigation efforts include inadequate early warning systems, limited evacuation routes and facilities, insufficient resources for disaster preparedness, and gaps in public awareness and readiness. While community sustainability strategies are expected to be able to propose strategies to improve the sustainability of communities in the face of volcanic hazards, these strategies may include improving early warning systems, improving evacuation planning and infrastructure, enhancing community-based disaster preparedness initiatives, strengthening collaboration between government agencies, NGOs, and local communities, and integrating traditional knowledge.

Keywords: disaster mitigation, communities, mountains, strategies, challenges

INTRODUCTION

Indonesia is a country with high levels of natural disasters, such as volcanic eruptions, earthquakes, tsunamis, floods, landslides, and so on. At least 257 disasters occurred in Indonesia out of a total of 2,866 in Asia during that period. Data suggests that Indonesia is one of the countries with the highest rate of poverty in the world, more than 10 times the rate in the United States. Earthquakes caused by the interaction of tectonic plates can trigger waves when occurring in the ocean. (Baharuddin, 2022). This geographical position then became one of the most common causes of volcanic eruptions, even high-power earthquakes (Mulyati, 2022). Volcanic eruptions are one of the natural disaster phenomena that needs to be studied more thoroughly. According to the latest BNPB data, as many as 156 volcanic eruptions occurred in Indonesia during the year 2010 to 2020. The peak is in 2018, there

were 63 cases of volcano eruption recorded throughout the year. The last record in 2020, there were 14 volcani eruptioner among them are the result of the erupts of Mount Semeru, Mount Merapi, Mount Sinabung, Mount Anak Krakatau, to Mount Ile Lewotolok. This number has doubled compared to the previous year, 2019 with a total of 7 incidents throughout the year (Azmi, 2021).

One of the most devastating volcanoes in North Sumatra is Mount Sinabung, located in Karo district. Natural disasters, such as the eruption of a sinabung mountain, have caused many people to lose their homes and even die. On August 27, 2010, Mount Sinabung erupted again, where it had never erupted since 1600. (Mulyati, 2022). According to data from the Media Center at Posko Pending Eruption Mount Sinabung 2013, on 1 and 2 November 2013 there was an increase in activity so that the status was upgraded from alert (level II) to alert (levels III). On 3 November 2013 at exactly 03.00 BGN its status was re-improved to vigilant (level IV) and as of 3 November 2013, an emergency response period was established. The impact of Mount Sinabung's eruption is the presence of refugees from the affected areas around Mount sinabung.

As of 24 February 2014, the number of refugees was 15,996 or 5,021 people, consisting of 1,414 elderly, 142 pregnant mothers, 899 babies, spread over 33 shelters. (Data Posko Tanggap Darurat Gunung Sinabung tahun 2014). Then continued on May 21, 2016 at 16:48 pm, Mount Sinabung erupted again with a heat cloud as high as 4.5 kilometers. This heat cloud encircled the village of Gamber, Simpang Empat district, Karo district. As a result, seven people died, and two others suffered burns. The victims are known to be in the red zone of the village of Gamber, which is about 4 km from Mount Sinabung until May 22, 2016, there have been four eruptions.

The eruption of Mount Sinabung is one of the main phenomena of concern to this day, because the natural disasters of volcanic eruptions resulted in huge casualties and losses. A dangerous eruption or volcano will have a direct or indirect impact on the lives of the people around it. (Dzulfikar, 2017). The immediate danger is the danger caused by materials coming out of volcanic eruptions such as lava streams, rocks, hot clouds, pebbles and hot rains that, if exposed, would kill life around them, including the inhabitants. The indirect danger is a laurel flow or flood of laurels due to the accumulation of volcanic material in the slopes. (Elvi, 2023).

Based on the above data, it is known that the impact of the Mount Sinabung eruption is grouped into physical and non-physical damage to the environment as well as social losses that are direct physical impacts on the structure of the building. Damage to the community in the form of injuries and deaths. While indirect damage is that which affects society as a result of the destruction of means and supplies and further results in the loss of enterprise (Evi, 2019), to address the above-mentioned problems, it is necessary to plan a mitigation strategy with a scientific approach, i.e., action that can focus on disaster prevention, avoiding the placement of humans and property in hazardous areas. Including efforts to control danger through the construction of special facilities and the application of specific technologies. Other efforts include building a community of people concerned with disaster mitigation (Syarif, 2019). Yet, of course, this is a challenge in building communities in villages that have a high potential for disasters. Neither the awareness nor the enhanced ability to cope with the threat of disasters. The empowerment of the community is aimed at managing the risk of disasters through the level of involvement of the party or community group in the planning and use of local resources in implementation activities by the community itself. Based on the problems and data that have been outlined, researchers are interested in studying and finding out how challenges and strategies can be pursued in building the sustainability of communities in Karo district. The purpose of this research is to study and analyse the challenges and strategies of strengthening the sustainability of the community affected by volcanic eruptions.

LITERATURE REVIEW

Disaster Mitigation Strategy

Disaster mitigation is a series of efforts to reduce the risk of a disaster, both through physical development as well as awareness and increased ability to cope with disaster threats. Disaster mitigation aims at minimizing the impact of disasters, protecting lives and property, and contributing to the long-term resilience of communities to natural or man-made hazards. Mitigation is an early stage in the disaster management cycle, which will later

determine the success of disaster risk management. (Mark, et.al, 2014). Mitigation of sustained efforts to reduce the impact of disasters on humans and property (Putra, 2014).

Meanwhile, mitigation under Law No. 24/2007 on Disaster Reduction is a series of efforts to reduce the risk of disasters, both natural and man-made. Mitigation is a form of protection that can be started with preparation before a disaster occurs, then assessment of hazards, and disaster management, such as rescue, rehabilitation and relocation. (Sugiharyanto, et.al., 2014). From some views on mitigation, some conclusions can be drawn that disaster reduction is a term used to refer to actions to mitigate the impact of disasters that can be done before they occur, including preparedness or actions to reduce long-term risks. So disaster mitigation or disaster management becomes a very important activity and of course also requires the full role and awareness of the community for its success (Bramasta, 2021).

Mitigating the Mount Sinabung eruption disaster is vital to protecting human life, preserving cultural heritage,ining economic stability, protecting the environment, and ensuring the overall well-being of the affected communities. Disaster mitigation as a measure in disaster risk reduction is categorized into two categories based on its action, namely structural and non-structural and each of the strategies proposed will also be closely related to each other. In the context of strategies to maximize disaster mitigation efforts carried out with mapping, mappings, monitoring, dissemination of information, socialization and disclosure as well as early warning (Ighuci, 2011).

Sustainability Community

Takes into account and meets a variety of human needs, not just one need and excludes the others. It's a place where people from different backgrounds and perspectives feel welcome and safe, where each group has a seat at the decision-making table, and where wealth is shared. (Irfani, et., al., 2021). It requires a long-term perspective – focusing on anticipation and adaptation to changes in the present and future. Sustainable communities manage human, natural, and financial resources to meet current needs while ensuring that adequate resources are available for future generations. A strong community is the foundation for a peaceful and healthy planet for mankind.

Natural disasters, climate change, income inequality, and social injustice are the greatest threats to building strong and sustainable societies, so these challenges determine the sustainability of communities. (Kun Zhanga, 2020). Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of present and future populations, are sensitive to their environment, and contribute to a high quality of life. A sustainable community manages human, natural, and financial resources to meet current needs while ensuring that adequate resources are available to future generations. The elements of a sustainable society include leadership, engagement and civil responsibility; ecological integrity; economic security; and social well-being. Sustainable communities will be more resilient to the impact of social, economic, climate and natural disasters. With shared values and beliefs, people will be more able to unite to survive and thrive, no matter what difficulties they face (https://sustain.org/about/what-is-a-sustenable-community/.

Sustainable communities are people committed to building communities together. They are highly informed and actively involved in making decisions that affect their lives. In making decisions, they consider long-term benefits for future generations as well as themselves. To measure community sustainability is done by looking at the three aspects of a healthy environment, a dynamic economy, and social well-being. (Rozak, et.al, 2023). Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The definition emphasizes meeting needs, compared to desire, and places a clear focus on equity between generations. (Manghayu, 2017).

METHODOLOGY

This research is qualitative research with a type of descriptive (Bungin, 2007). Meanwhile, this research is a scientific paradigm that leads to a natural paradigm known as phenomenological (Cresswell, 2010). The research was carried out in Karo district of North Sumatera Province, which is at Karo high. The researchers took the location of the research exactly in Mount Sinabung district Karo, due to the fact that Sinabung has a fairly high rate of eruption and a sharp compared to the other mountains that are in North Sumatra.

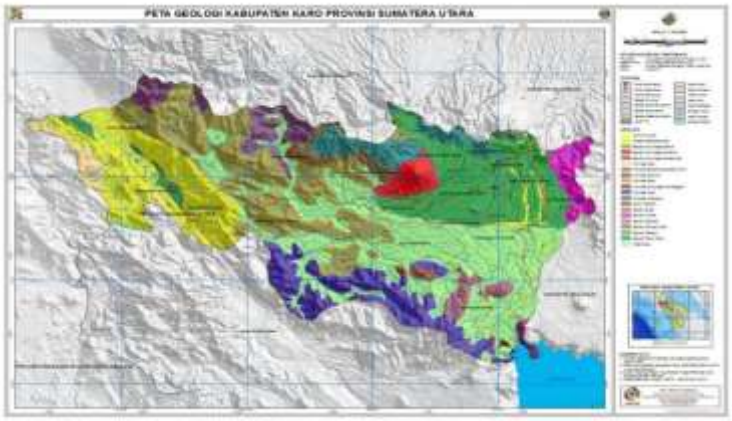

Figure 1. Map of Karo Regency

The sources of information are public figures or leaders who have historical knowledge and understanding of local customs and practices related to disaster mitigation, indigenous figures, local practitioners of the Disaster Risk Reduction Forum (PRB), local academics and researchers, scholars and scientists with regional expertise, anthropology, and government officials. (BPBD). As for the source of seven informants, including the village chief, community figures, local practitioners, academics, cultural and religious authorities, Disaster Risk Reduction Forum (PRB), NGOs, Regional disaster management agency. The research is located in Karo district, which includes Naman Village, Ndeskati Village, and Kuta Rakyat Village.. It is used to acquire knowledge and observe behavior and research localized activities. Observations on this research are used to gather data related to the focus of the research. Documentation techniques are done to obtain data in the field by recording the whole of things found. Research data about informants are recorded in the logbook in the form of tables, charts, schemes and diagrams as well as brief narratives. Focus Group Discussion (FGD) (Bungin, 2007). Data processing and analysis is carried out with stages of data reduction, data presentation and conclusion making, then the data is analyzed qualitatively.

DISCUSSION

For the people who live around the slopes of Mount Sinabung has a great impact on the lives of the people. Changes eventually come and lead people to adapt, survive, and adapt to those changes in order to live. Disasters will diminish the ability of people to possess and access livelihoods, which are human, social, natural and environmental, physical and infrastructural as well as financial, either individually or to higher social units. The Mount Sinabung disaster in Indonesia has been a long-term challenge for affected communities and authorities. Disaster mitigation of this kind involves a multifaceted approach, which usually includes preparedness, response, and recovery efforts.

Mount Sinabung eruptions occurred several times starting in 2010, 2013, 2015, 2016, 2018, 2020 and 2021. Nevertheless, this did not cause the entire population around the slope of Mount Sinabung to relocate as well as one of the villages whose people still live in the village despite the eruption, the village of Kutarakyat. The volcanic

eruption caused losses in various fields, resulting in people losing their livelihoods and communities being unable to function to meet the needs of communities.

The phenomenon of disasters makes communities more vulnerable, communities must be able to adapt to new situations in order to return to good conditions. The vulnerability of a community will affect the resilience process, but the high vulnerability in a community does not necessarily mean that the community is not resilient, because adaptation is a community's ability to modify or change behaviour in order to cope with and face disasters. Adaptation will determine resiliency because adaptive capacity is an essential component for achieving a resiliente community. Community resilience requires joint action so that the entire community can be resilient by leveraging its adaptive capacity. Here is a picture of the people affected by the eruption of Mount Sinabung:

Figure 2. Impact of Sinabung Erption

Source: https://www.beritasatu.com/news/160089/rumah-ambruk-akibat-debu-vulkanik-sinabung

Not only has it affected the housing conditions of the people, the eruption of Mount Sinabung has also devastated the economic conditions of people in 2020 through the failure of community panels in four districts in Karo District, North Sumatra covered by volcanic ash. As a result, hundreds of farms owned by farmers failed to harvest, while information obtained from the people of Sukatepu Village, the Namanteran department, Jon Printis complained that the harvest failed because his peach fields were covered by volcanic ash.

This suggests that Mount Sinabung's eruption has not yet shown signs of an end, prompting the development of mitigation strategies to enhance sustainable, resilient and self-reliant communities. Mitigating the disasters caused by the Mount Sinabung eruption presents some significant challenges that need to be overcome in order to improve the sustainability of societies.

Some of these challenges include, first, the geographical constraints of Mount Sinabung which is in a densely populated area add to the complexity of disaster mitigation efforts. The proximity of communities to the volcano increases the risk of falling victims and damaging infrastructure during the eruption. Second, volcanic uncertainty is that Mount Sinabung eruptions are often unpredictable, with varying intensity and duration. This uncertainty complicates the implementation of early warning systems and an effective evacuation plan, as eruptions can occur suddenly with little warning. Third, the limited resources of the communities around Mount Sinabung such as funding, equipment, and trained personnel, to fully prepare and respond to a volcanic eruption. Resource constraints can hinder the implementation of mitigation measures and recovery efforts. Fourthly, the significant social and

economic impact on the affected communities. Refugees, loss of livelihoods, damage to infrastructure, and psychological trauma are some of the impacts that can undermine the sustainability of societies.

Fifthly, effective communication and exchange of information are essential to the success of disaster mitigation. However, language barriers, limited access to technology, and inadequate communication infrastructure can hinder efforts to disseminate timely and accurate information to vulnerable communities. Six, factors such as mistrust, cultural convictions, and differences in priorities can hinder public participation in mitigation initiatives. Seventh, environmental degradation includes soil erosion, loss of biodiversity, and water pollution. Addressing these environmental impacts is vital to fostering long-term sustainability of societies. Eighth, sustainable disaster mitigation requires long-term planning efforts and preparedness. However, priority competition, political instability, and short-term focus can hinder efforts to develop and implement comprehensive mitigating strategies.

To address these challenges, a multi-faceted approach has been adopted involving collaboration between government agencies, NGOs, local communities, and other stakeholders. By investing in early warning systems, improving public preparedness, promoting sustainable livelihoods, and addressing socio-economic vulnerabilities, we can improve the sustainability of communities in the face of Mount Sinabung eruption. To address the various challenges that sustainability communities face in mitigating natural disasters, Mount Sinambang eruptions have been pursued.

1. Implementation of a strong early warning system is essential to provide timely warning to communities at risk of Mount Sinabung eruption. It involves installing seismic monitoring equipment, satellite surveillance, and other technologies to detect signs of volcanic activity. Besides, building communication channels to spread warnings effectively to local authorities and communities is also important. Planning and Preparedness
2. Developing a comprehensive evacuation plan and conducting routine exercises is an important component of disaster mitigation. The plan should identify evacuation routes, safe zones, and shelter locations for refugees.
3. Strengthening vital infrastructure such as roads, bridges, and utilities can minimize damage and disruption caused by volcanic activity. Repairing buildings to resist ash rain, lava, and other volcanic hazards is also important to ensuring the sustainability of communities. In addition, the development of alternative infrastructure solutions, such as decentralized water and energy systems, can reduce reliance on centralized facilities that are vulnerable to volcanic eruptions.
4. Encouraging diversification of livelihoods can help reduce the economic impact of Mount Sinabung's eruption on local communities. This includes support for activities that generate alternative income that are not too vulnerable to volcanic hazards, such as agriculture in low-risk areas, ecosystems, and small-scale industries. Providing vocational training and access to microfinance can empower communities to build resilience to the economic shocks caused by volcanic activity.
5. Protecting and restoring the natural ecosystems around Mount Sinabung is essential to mitigate environmental degradation and reduce the risk of secondary hazards such as landslides and floods. Implementing reforestation programmes, erosion control measures, and sustainable land management practices can help stabilize slopes and preserve biodiversity. In addition, the establishment of protective zones around volcanoes can limit human exposure to volcanic hazards and increase ecosystem resilience.
6. Involving local communities in disaster mitigation efforts is crucial to their success. This includes raising awareness of volcanic risks, developing community-based initiatives, and enhancing local knowledge and traditional disaster management mechanisms. Building the capacity of local governments, community figures, and volunteers to coordinate emergency response and facilitate recovery efforts is also important for improving the sustainability of communities.
7. Effective disaster mitigation requires collaboration between government agencies, NGOs, academics, and other stakeholders. Building a multi-stakeholder platform and coordination mechanisms can facilitate information exchange, resource mobilization, and joint decision-making.

By leveraging the expertise and resources of a wide range of stakeholders, we can develop integrated and sustainable solutions to mitigate the impact of Mount Sinabung's eruption on society. By implementing such disaster mitigation strategies, the viability and resilience of communities in the face of Mount Sinabung volcanic activity can be improved. However, it is important to adapt these strategies to the context and specific needs of local communities, taking into account factors such as socio-economic vulnerabilities, cultural considerations, and environmental dynamics.

CONCLUSION AND RECOMMENDATION

The proximity of communities to the volcano increases the risk of falling victims and damaging infrastructure during the sinabung eruption. An uncertain volcanic phenomenon is that Mount Sinabung eruptions are often unpredictable, with varying intensity and duration. This uncertainty makes it difficult to implement an early warning system and an effective evacuation plan, as eruptions can occur suddenly with little notice. The challenge is the availability of resources for mountain sinabung activities such as funds, equipment, and trained personnel. Resource constraints can hinder the implementation of mitigation measures and recovery efforts. Not only that, the social and economic impacts seen on societies are the presence of refugees, the loss of livelihoods, infrastructure damage, and psychological trauma are some of the impacts that can undermine the sustainability of societies.

Limited access to technology, and inadequate communication infrastructure can hinder efforts to disseminate timely and accurate information to vulnerable communities. This could include advocating increased funding for volcanic surveillance and research, updating land-use planning regulations to minimize risks in vulcanic hazard zones, and integrating disaster risk reduction into the development planning process. The main challenges and constraints in current disaster mitigation efforts include inadequate early warning systems, limited evacuation routes and facilities, insufficient resources for disaster preparedness, strategies inining community sustainability can be done with synergies of various related sectors and eliminating sectoral egos. Thus all aspects of challenges and constraints can be overcome. In the end, it can provide well-being for the people affected by the Sinabung mountain eruption so that they can survive.

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