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Community Based Mitigation
(Case Study Of Mount Sinabung Eruption Karo Regency, North Sumatra Province)

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Abstract

Sinabung has erupted several times over the past few days spewing massive clouds of superheated gas and ash in to the sky and down its slopes in deadly pyroclastic flows. It's dangerous or high risk for the local residents if the Mount Sinabung continuing eruption and will be threat thousands of people who live around the slopes. The main objectives of this research are to indentify history eruption of Mount Sinabung, to describe relocation area for refugees and to obtain information about community based mitigation in the case of Sinabung. This research uses qualitative research methods, where primary data is obtained through observation and semi-structured interviews and secondary data is obtained from literature and agencies data. The result showed that there are no confirmed historic eruptions before the re-awakening in August 2010 after 400 years dormancy, it has had activity in around 1600, recent documented events include an eruption in August 2010 ; September and November 2013; January, February and October 2014; June 2015; May 2016 and January, February, August 2017. Many of refugees have been relocated to several relocation area such as Siosar and Simpang Empat Subdistrict. The local residents around Sinabung had litle experience in dealing with its activity because there is litle information in terms of historical precedents. These are caused the vulnerabilities and risk of Mount Sinabung eruption is high. Community Based Tourism is the best strategy to reduce vulnerabilities and minimize human suffering in the case of Sinabung.

Keywords: Sinabung Eruption, Relocation Area, Refugees, Community Based Mitigation

Introduction

Natural disasters are generally considered as a coincidence between natural hazards (such as flood, cyclone, earthquake and drought) and conditions of vulnerability. There is a high risk of disaster when one or more natural hazards occur in a vulnerable situation (Makrey, 1989) : Risk = Vulnerability+ Hazard. Hazard is the probability that in a given period in a given area, an extreme potentially damaging natural phenomena occurs that induces air, earth or water movements, which affect a given zone. Vulnerability of any physical, structural or socioeconomic element to a natural hazard is its probability of being damaged, destroyed or lost. Risk can be related directly to the concept of disaster, given that it includes the total losses and damages that can be suffered after a natural hazard: dead and injured people, damage to property and interruption of activities. Risk implies a future potential condition, a function of the magnitude of the natural hazard and of the vulnerability of all the exposed elements in a determined moment.

Volcanic hazards include explosions, lava flows, bombs or ballistics, ash or tephra, pyroclastic flows, pyroclastic surges, mudflows or lahars, landslides, earthquakes, ground deformation, tsunami, air shocks, lightning, poisonous gas and glacial outburst flooding. Each hazard has a different consequence, although not all occur in all eruptions or in association with all volcanoes. The risk of volcano will be high if its among of the settlements. Indonesia has the world's greatest at risk population hazards and is the most volcanically active nation on the earth. One of the active volcano in Indonesia is Mount Sinabung. Mount Sinabung (2600 m) is a typical stratovolcano in the Karo plateau western province of North Sumatra. Geographical location of this volcano is 03°10' N dan 98°23,5' E. The fertile volcanic soil and the cool

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temperature of the slope make it ideal to grow fruits, vegetables and flower. There are 23 villages on the slopes of Mount Sinabung. The villages are Mardinding, Kuta Mbaru, Temberun, Tiga Nderket, Perbaji, Selandi, Sukameriah, Guru Kinayan, Berastepu, Gamber, Sibintun, Bekerah, Simacem, Sukanalu, Kuta Tonggal, Sigarang-garang, Kuta Rakyat, Kuta Gugung, Kebayaken, Kutambelin, Naman, Kuta Tengah and Lau Kawar. It's dangerous or high risk for the local residents if the Mount Sinabung continuing eruption and will be threat thousands of people who live around the slopes.

Method

This research uses qualitative research methods, where primary data is obtained through observation and semi-structured interviews and secondary data is obtained from literature and agencies data.

Results and Discussion

Mount Sinabung Eruption

Sinabung has erupted several times over the past few days spewing massive clouds of superheated gas and ash in to the sky and down its slopes in deadly pyroclastic flows. Sinabung eruption is classified asphreatic/water vapor type followed by volcanic ash fall spread east-southeast Mt. Sinabung, covering the villages of Sukamerah, Gungpitu, Sigarang-garang, Sukadebi, and Susuk (PVMBG, 2013). There are no confirmed historic eruptions before the re-awakening in August 2010 after 400 years dormancy, it has had activity in around 1600. In 1912, fumaroles have been active but no eruption followed the increase of fumarolic activity then (PVMBG, 2013). When the Sinabung erupted in 2010, at least two people were killed and 30,000 others were displaced. The volcano has covered villages nearby in ash and debris. Sinabung continued to spew volcanic ash throwing a plume 8,000 meters into the atmosphere in September 2013, three years after inactive. Villages and the fields are covered with volcanic ash. Up to 4,300 residents have been evacuated from the villages due the volcanic eruption of Sinabung. In 2014 at least 16 people have died and 32,355 residents were evacuated at the time but some locals still enter the zone, staying intermittenly to tend to their homes, property and farms.

Table 1. The Villages on The Mount Sinabung Slopes have been Evacuated

Districts	Villages
Tiga Nderket	Mardinding, Kuta Mbaru, Temberun, Tiga Nderket, Perbaji
Payung	Selandi, Sukameriah, Guru Kinayan
Simpang Empat	Berastepu, Gamber, Sibintun
Naman Teran	Bekerah, Simacem, Sukanalu, Kuta Tonggal, Sigarang-garang, Kuta Rakyat, Kuta Gugung and Lau Kawar

Source : BNPB, 2014

In May 2016, the government evacuated 9,319 residents, divided into 10 shelters in Kabanjahe, Regency of Karo. The Sinabung eruption on August 2, 2017, ejecting a plume of ash and smoke up to 5.4 km (18.000 feet) above sea level. It was one of Sinabung' biggest eruption in the past several months. The eruptions was produced a large pyroclastic flow and tumbled down the east and southeast slopes as far 4.5 km reaching the Labortus River. Then volcanic ash cloud was reaching a height 5.4 km above sea level. Thousands of people in the villages were directly affected by ash fall.

The Indonesian goverment has placed an area of radius 4.1 miles around the peak under a red-alert high risk danger zone. The volcano has been placed under a high risk warning ever since 2010 as eruption are continuing on a periodic basis. BNPB recomended local residents and visitors to not perform any activities in the radius 3 km from the summit, 7 km for south-southeast sector, 6 km for southeast-east sector and 4 km for north-east sector (BNPB, 2014).

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National Disaster Mitigation Agency (BNPB) estimates the eruption of Mount Sinabung has caused more than 100 million US dollars. More than 30,000 affected residents have been evacuated from ten villages. The villages are Perbaji, Sukatendel, Temberun, Perteguhen, Kuta Rakyat, Simpang Empat, Tiga Pancur, Selandi, Payung and Kuta Gugung (BNPB, 2014).

Relocation Area

Mt. Sinabung eruption has damaged the agricultural sector as the main source of economic activity in Karo District. The eruption was started by smoke and then followed by volcanic ashes, small materials, and pyroclastic flow, damaging 25,739 hectares of agricultural land (Agriculture Service of Karo District, 2014). Previously, the affected areas of Sinabung eruption produced various agriculture commodities such as paddy, corn, peanut, lettuce, tomato, chilly, cabbage, potatoes, oranges and others.

Table 2. The Number of Refugees Mount Sinabung at the Camps / Shelter

No	Villages	HH	People
1	Tiga Pancur	303	996
2	Mardinding	265	936
3	Kuta Tengah	160	516
4	Kuta Gugung Dusun Lau Kawar	266	1,048
5	Pintu Besi	79	285
6	Sukanalu	345	1,231
7	Ds.Sigarang-Garang	428	1,530
8	Ds. Jereya	192	672
Totals		2,038	7,214

Source : Kabkaro.go.id, 2017

The shelters are Paroki G. Katolik Kabanjahe, Gedung Serba Guna KNPI Kabanjahe, G.GBKP Simp. VI Kabanjahe, Gedung GBKP Ndokum Siroga, GPDI Ndokum Siroga, Gudang Konco, Gudang Jeruk Surbakti /TK Surbakti, and Jambur Korpri. The shelter lack basic water and sanitation facilities, and provide little privacy.

Phase I : around 370 households from the three villages have been relocated to the relocation area of Siosar. Community assistance houses, agricultural land area of 0.5 hectares per family and other assistance. This area relocation for three villages that have been destroyed by Mount Sinabung eruption. The villages are Sukameriah Village (2,50 Km²), Bekerah Village (3,82 Km²), and Simacem Village (4,65 Km²), located 3 km from the peak of volcano.

Phase II : August 2017, 348 temporary residential in the 4 location are Ndokum Siroga Village (88 units), Ndokum Siroga II Village (86 units), Ndokum Siroga III Village (100 units) and Tiganderket Village (74 units) Simpang Empat Subdistrict for three villages are relocated: Kuta Gugung, Pintubesi, and Mardinding. When thhis command is working hard to complete the relocation phase II for 1,903 households. A total of 1,655 houshing units to be completed in August 2017. Furthermore, there are 1,050 households who have to be relocated phase III later. Land footprint has been prepared in Siosar to 2,053 households of 250 hectares. However, there are no available farm land so that people are not willing to be relocated.

While others are located in 5 km radius (Payung, Tiga Nderket, Naman, Kutambelin) and 7 km radius (Jandi Meriah and Batu Karang). The people in the affected villages of radius 5 km and 7 km, have already returned home and live normally.

Community Based Mitigation

A community is a group of individuals and households living in the same location and having the same hazard exposure, who can share the same objectives and goals in disaster risk reduction. Disaster mitigation is any action taken to eliminate or minimize the impact of a disaster on people, property and the

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environment (Federal Emergency Management Agency, 2004). Effective mitigation begins with identifying the threats and hazards a community faces and determining the associated vulnerabilities and consequences. Understanding risks makes it possible to develop strategies and plans to manage them. Managing risks from threats and hazards requires decision making to accept, avoid, reduce, or transfer those risks. Avoiding and reducing risks are ways to reduce the long-term vulnerability of a community and build individual and community resilience (National Mitigation Framework, 2016).

Community based disaster management (CBDM) is anchored in the disaster risk reduction framework. CBDM covers a broad range of interventions, measures, activities, projects and programs to reduce disaster risks, which are primarily designed by people in at-risk localities and are based on their urgen needs and capacities. Simply put, the aim of CBDM is to (1) reduce vulnerabilities and increase capacities of vulnerable groups and communities to cope with, prevent or minimize loss and damage to life, property, and the environment, (2) minimize human suffering, and (3) hasten recovery. In the case of Mount Sinabung, local residents were unfamiliar with its behaviour because it had been mostly dormant for hundreds of years. The local residents around Sinabung had litle experience in dealing with its activity because there is litle information in terms of historical precedents. These are caused the risk eruption of Mount Sinabung is high.

The Local Government Karo Regency coordination with BASARNAS and BNPB on community-level preparedness programmes. These include identifying threats, establishing the populations likely to be affected, risk mapping, training officials and conducting simulations and drills. The goverment has been giving several socialization to the local residents in the villages that affected by Sinabung eruption. The aims of the socialization are : (1) Volcanic hazard early warning system, (2) Information of susceptibility to volcanic hazard zone, (3) To calm down community in the volcanic hazard area, (4) To improve understanding and awareness on volcanic hazard phenomena as well as on the importance of local community, local governments, decision makers and public education, (5) Develop appropriate strategy and program for public education.

Conclusions

Volcanic activity at Mount Sinabung remains high. The volcano has been placed under a high risk warning and the local residents around the volcano have been evacuated. They displaced in the some post evacuation / shelter and evacuated to relocation area. But there are no available farm land and the goverment aids was insufficient to fullfil their daily needs that's why many of refugees return to their village. Local residents around Sinabung have great at risk population hazards because they had litle experience in dealing with its activity and behaviour. The government needs to reduce the risk by socialization, increase awareness and understanding of the residents that community based mitigation is important. A wide range of local innovative and do-able solutions to address and reduce local vulnerabilities results from the community based approaches in disaster mitigation by trusting and building capacity in identifying problems and risk assessment.

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