The Role of Community-Based Organization in Disaster Response at Mt. Sinabung

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Abstract. In August 2010, Mt. Sinabung in North Sumatera erupted for the very first time in 400 years; until that moment the volcano had been declared as dormant. In contrast to the communities living around Mt. Merapi in Java, the Mt. Sinabung communities had little to no preparation when faced with the sudden volcanic eruption. The Sinabung eruption caused disturbances as it ruined the farmlands and community’s sources of livelihood, especially since most of the community members are farmers. Most of the time, these farmlands are located not far from their house, so displacing them means moving them away from their main source of income. This makes some of the displaced keep moving back to their old villages to farm even though they are putting themselves in danger by doing so. This condition motivated the community to initiate Beidar, an organization to monitor volcanic activities and give out early warnings to villagers nearby and within the hazard zone to evacuate. This paper will study Beidar’s involvement with the community and the government, how they operate, and how they impact the community members living near the volcano. This data used in this study are primarily from interviews with Beidar members and organizers, volcanic monitoring posts, and the local disaster management. A thematic analysis of the interviews shows the history of Beidar’s development as an organization proudly independent of the government; the “recruitment” of members; the important roles in the community including mediating between government and other local organizations (e.g., volcano monitoring station); specific monitoring; communication and evacuation activities (e.g., including search activities after eruptions and lahars); contacts and sharing of experience with similar groups in Indonesia; and identifying the limits of their influence in preventing local people from returning to the red zone. This research concludes that Beidar was officially acknowledged as an organization in March 2014 under the wing of the Volcanology Agency, which needed help to disseminate the volcano status information to the community. Recruiting local youth is seen as a better alternative since the communities — especially the internally displaced community members — have little trust in the government due to the crisis and deemed them ‘incompetent’. Beidar, as a community-based organization, can fill the gap between the community and the government in terms of information dissemination, especially because they are local and are acknowledged as a trusted part of the community. However, this dynamic has a side effect of the villagers’ feeling of security with Beidar ‘watching over them’. This lowers their risk perception of the volcano, leading them to endanger themselves more by crossing over the hazard area to conducting their day-to-day activity.

1. Introduction

While Indonesia has experienced many disasters, the level of disaster preparedness varies across the country. In some places where experience with disasters is limited, the preparedness can be very low. Experience with disasters may lead to two types of responses. First, people are more aware and eventually build their capacity to deal with the disaster. Second, ignorance can increase when the impacts of disasters are considered small. Therefore, according to Lindell and Whitney, disaster experience is a good predictor
to determine community preparedness for disasters [1]. The case where experience with disasters is limited can be seen from community living at Mt. Sinabung, North Sumatra.

The community characteristics, such as social capital, can also determine community preparedness to disasters. The strong ties, collaboration, and leadership help to share knowledge on awareness and eventually activities to reduce disasters. In Japan, Jishubo or Jishu Bosai is an important community activity to increase disaster preparedness [2]. Another example of a community-based disaster risk management initiative is found in India. After the Gujarat Earthquake of January 2001, a joint initiative called Patanaka New Life (PNY) Plan was commenced to ensure effective rehabilitation. It was done to train and empower local masons and communities and focuses on rehabilitation including livelihoods [3].

In some places in Indonesia, social capital also plays an important role. West Sumatra is known for the strong ties between perantauan (migrants) and their kampung (village of origin). Therefore, during the response to the 2009 West Sumatra Earthquake, many community initiatives for assistance took place [4]. In Yogyakarta, gotong royong (communal work) takes form as community preparedness and response to disasters [5], led by the leader of a village (desa) or sub-village (dusun). Examples of disaster risk management efforts initiated by the community near volcanoes are also present at Mt. Kelud and Mt. Merapi, both are located in Java Island. Both communities are started by local amateur radio clubs, i.e., Jangkar Kelud and Jalin Merapi.

In August 2010, Mt. Sinabung erupted for the very first time in 400 years; until that moment the volcano was declared as dormant. A total of 900 households or about 12,000 people were evacuated and returned home, with two causalities [6][7][8]. Later in 2013, the volcano erupted again with activity continuing up to the present. Many of the communities have been forced to relocate or stay in evacuation shelters for about three years.

The long dormancy of the Sinabung Volcano made the communities unaware of its threats and of how unprepared they were. Prior to the eruption, there has been no community-based disaster management activity; community activities are usually in form of ceremonies for weddings or births. The Karo are a unique ethnic group in Indonesia. They are part of the Batak people, an appellation created to differentiate the pagan inhabitants of the Bukit Barisan mountain range from the Malays, the Muslim lowlanders of the coastal area [9]. They have a distinct kinship and clan system, where the main patri-clan is composed of five marga: Ginting, Karo-karo, Perangin-angin, Sembiring, and Tarigan. The most important connections are the ones among Sukut (Senina or Sembuyak) agnate, a person sharing male ancestors, Kalimbubu wife-giver, and Anak-Beru wife-receiver. What the Karo society aims at, is to create and maintain the unity of Sangkep si telu, meaning the completeness of the three that hold together the entire society: kalimbubu is the head, senina the stomach, and anakberu the legs because they serve both other groups [10]. These entities are so intertwined that if one has a reason to suffer everybody does. This is why they constantly help each other in order to reinforce their unity [11]. Social capital in Karo culture is strong since they are very tightly knit rooted from the kinship culture. Decision-making in Karo culture is done by runggun, an institutionalized process of formal deliberation and decision-making by consensus within a group of people who, because of the kinship ties between them - senina, ankberu, and kalimbubu - form a unity (sangkep si telu) [12].

The Sinabung eruption caused disturbances as it ruined the farmlands and the community’s source of livelihood, especially since most of the community members are farmers [13]. Most of the time, these farmlands are located not far from their house. However, the eruption displaced the communities to places far away from their main source of income. This situation created a problem since it makes some of the displaced people keep moving back to their old villages to farm even though they are putting themselves in danger by doing so [14]. The animal husbandry and fishery sectors were also affected by the disaster; many cattle are dead or went missing and there was also damage to barns and fishponds. Assistance from outside of communities would also contribute to the level of preparedness. Sagala et al. found that the level of preparedness in Mt. Merapi is determined by individual, community, and institutional variables [5]. External assistance, such as from NGOs, can play a role to increase the community’s capacity through disaster simulation & education, while the government can provide immediate goods and
logistics to move people away from the disaster. However, as said before, the communities in Mt. Sinabung lack in terms of experiences as well as assistance.

Nonetheless, the length of the eruption has triggered the affected communities at Mt. Sinabung to build their own capacity by forming a group called Beidar. This name means mountain goat in the local language and it is a group formed by the people living on the flanks of Mt. Sinabung. The group initiates activities to monitor volcanic activities and give out early warnings to evacuate to villagers nearby and within the hazard zone. The emergence of this group indicates strong social capital and a need to increase community capacity to deal with the issues. How was this group formed and what has been achieved? Furthermore, to what extent has it contributed to disaster response? These are the main research questions that this paper aims to address. Therefore, this paper will study Beidar’s involvement with the community and the government, how they operate, and how they impact the community members living near the volcano.

2. Mt. Sinabung eruption (2010-2017)

Mt. Sinabung is a volcano located in Karo District, North Sumatera Province. It was considered category “B” or ‘dormant’ due to its inactivity for 400 years until it erupted for the first time from August to September 2010; the volcano status rose from “Alert” to “Beware” within the same day [15][16]. The explosion was massive and authorities evacuated at least 12,000 people from high-risk areas [17]. In 2013, the volcano erupted again and has not stopped ever since.

![Mt. Sinabung Location](image1.png)

**Figure 1. Mt. Sinabung Location**

![Mt. Sinabung Eruption Timeline](image2.png)

**Figure 2. Mt. Sinabung Eruption Timeline**
According to the Mount Sinabung Post-Disaster Action Plan 2015-2017 [18], the eruption causes damages in many sectors such as residential, infrastructure, economy, social, etc. The worst affected is the residential sector, with 9,212 damaged units consisting of permanent housing, semi-permanent housing, and non-permanent housing; causing IDR 480,21 billion (US$ 36,56 million) of damage and IDR 25,69 billion (US$ 1,96 million) of loss. Most of the damages are tin roofs that corroded by the acid in the volcanic ashes. The worst happened in Tigandreket Sub-district, Simpang Empat District, and Naman Teran District, while the most happened in Payung Sub-district with 3,719 housing units damaged.

3. Literature review

3.1. Community-based organization in disaster risk management

Community organization is a process initiated by the community, that signifies their need and they take action by developing cooperative practices. They usually focus on improving a characteristic of the community; these organizations tend to view their program in a broader community perspective [19][20]. CBOs may have different visions depending on their situation and needs at the time, one of them is disaster risk management [21].

Governments tend to respond more to political pressure than to reasoned arguments in changing their policies, which can be exerted by the people and their organizations. In disaster events, the community has more to lose by being exposed to disasters and has most to gain by reducing disaster impacts in their community. Through community-based disaster risk management (CBDRM), they have the capacity to respond to emergencies in particular [3].

CBDRM focuses on a wide variety of aspects of housing, health, livelihood, education, and so on [22]. This is anchored in the Disaster Risk Reduction framework and may cover intervention, response, assessment, projects, and programs designed by people at risk who know more about their needs and capacities [21]. CBDRM is also integral in increasing participation, obtaining resources, and changing policies and regulations [22].

3.2. Volcanic Disaster Community-Based Organizations in Indonesia

In Indonesia, there are a number of CBDRM communities with a different focus. The main focus is on risk communication and early-warning near active volcanoes. Jalin Merapi and Jangkar Kelud are two examples of CBDRM focusing on risk communication initiated by communities living near active volcanoes.

3.2.1. Jalin Merapi

Mount Merapi is an active volcano located in Central Java. During the last two centuries, this volcano has erupted explosively every 8-15 years and more violently every 26-54 years and the repose periods have not exceeded 3.5 years [23]. In 2006, the community at the Merapi underwent a period of volcanic crisis that lasted for months and in 2010 Mt. Merapi erupted again bigger than before, releasing larger SO2 emissions than any of the recorded eruptions before (from 1992-2007) [21][24].

In 2006, Jalin Merapi or Jaringan Informasi Lingkar Merapi – Information Networks of Merapi Circle was established by the local community living around Mt. Merapi. It is a social movement aimed to improve information sharing within Merapi communities, engaging three local community radio stations: K FM (Dukung, Magelang), Lintas Merapi FM (Deles, Klaten), and MMC FM (Selo, Boyolali). It has assisted the locals in developing their awareness of the Merapi hazards [25]. These three radio stations have established a network with some NGOs (Forabi, WALHI, COMBINE, Community Radio Network Yogyakarta and Central Java Community Radio) [25].

In 2010, when Mount Merapi was active again, Jalin Merapi engaged two other community radio stations, Gema Merapi FM (Cangkringan, Sleman) and Lahara FM (Salam, Magelang). Although radio is the most commonly used medium in sharing information about the Merapi in the community, it only covers one-to-one-points and is considered expensive by the community. Moreover, it only covers a
particular area [26]. Jalin Merapi improvised with expanding to a website, Twitter, and Facebook. After the first eruption, they also added a volunteer form on their website. Now, they have even recruited and assigned approximately 700 volunteers to assess the needs of the internally displaced community members and help distribute relief aid [27][28]. Jalin Merapi used to only upload recent photos of the Merapi conditions but it has branched out to reach a wider audience using a web portal made using open source software [29].

Not only as an early warning system, Jalin Merapi also accurately convey important information and data to support the decision-making process. It is a network and does not interrupt the community’s way of communication [24][26]. Their information is regarded as the primary information source by the community, more reliable than television and even quicker than authorized information. This high trust level increased participation and collective action, especially in the form of information sharing for relief distribution [26].

3.2.2. Jangkar Kelud

Mt. Kelud is an active volcano in East Java. It has had approximately 40 eruptions since 1000 AD. The most recent eruption happened in 2014 and saw a successful community response and an effective warning and mitigation system. A total of 166,000 people managed to evacuate after the Awas (Warning) level was issued at 21:15 local time on 13 February 2014 [30]. The communities around the volcano understand the contingency plan and risk map of the local area well [31]; supported by the community’s communication this resulted in zero casualties in the 2014 eruption [32]. Similar to Jalin Merapi, Jangkar Kelud (Jangkane Kawula Redi Kelud-The Hope of the Kelud Community) is a social movement initiated by the community that is based on the communication network as disaster mitigation effort [33], that was established in August 2008 [32]. Their main tool for communication is the walkie-talky, and they also include at least 13 community radio stations in Blitar, Kediri, and Malang Districts. Nine of them use walkie-talkies; information is acquired from observation posts and disseminated in informal ways [30].

Jangkar Kelud was started by the amateur radio community and grew bigger as the members felt a sense of responsibility to be involved in disaster risk management and to raise awareness on Mt. Kelud [32]. Capacity improvement in Kelud communities was a combination of top-down support and bottom-up initiatives. Jangkar Kelud also collaborates with the Nature Lover Community (KAPPALA) and the Center for Disaster Management Study of University of National Development [30].

4. Results & discussions

This study is a part of a bigger research on the role of culture in facilitating disaster-resilient communities in the Mt. Sinabung area. The data collection is done through distributing questionnaires, observations, and in-depth interviews with community members and key informants such as the government, international and local non-governmental organizations, journalists, activists, religious figures, and village heads.

This study uses the data acquired from interviews and observations with Beidar members and organizers, the Mt. Sinabung volcanic monitoring posts (PGA), local disaster management, the Mt. Sinabung Volcanology Center and Mitigation of Geological Disasters (PVMBG), journalists, and local communities. The interview questions were a combination of exploratory and theoretically-informed questions about their work.

Data analysis was done using qualitative analysis. Data was transcribed from interviews and observations into written text. The interviews started during the disaster itself. The fallibility of memory is anticipated and remedied by cross-checking the statements with those of other interviewees, with the author’s own observations, and with other documents.

5. Findings

Mount Sinabung first erupted in 2010; the sudden eruption combined with the lack of knowledge on the volcano’s activity has claimed many lives and loss until present. The Volcanology Center and Mitigation
of Geological Disaster Office (PVMBG) at that time decided to disperse information on volcanic activities and eruptions to communities surrounding Mt. Sinabung and send one of their partners who is a native Karo to return to his hometown and help them to communicate with locals. This person, Hasron, then founded a network to volunteer on dispersing information about Mt. Sinabung’s volcanic activities and eruptions; although unnamed at the time, this network will soon become “Beidar”.

Supported by the Volcanology Office, Hasron was invited to a meeting with Volcanology and UN-OCHA on October 2010, he was offered assistance to build a community focused on risk communication in Mt. Sinabung.

“Back then, our members were village youths, they are beneficial as a channel (towards the community). For example, back then, the maze of information from volcanology to community was not up. And then I was tasked to relay the information to the community, and I told them (village youths) that this is what they have to do” – NGO founder

Beidar was officially founded in March 2014 and acknowledged as an organization. Its vision is to bridge volcanic information received from the Volcanology Office to the community. Beidar is named after an endemic mountain goat species in North Sumatera. During the first eruption, hoards of mountain goats went down the mountain, as if alerting the community of the imminent danger.

Beidar’s main activity is to act as ‘volcano’s early warning agent’; its members work closely with the Volcanology Office in monitoring the lava dome and relaying information towards the community. Their main tools for communication are walkie-talkies and cellular phones, as the Mt. Sinabung communities at the time were not very familiar with social media such as Twitter. Since Beidar’s members are also village youth, each member is stationed in their village on standby whenever they receive any information on volcanic activity from the Volcanology Office. Not only to the community, at times they even provide information to local newspapers on information related to Mt. Sinabung.

“I used to be a photographer, and sometimes I took photos of the lava dome’s growth. I share those photos to the Volcanology Office. And then if they confirmed that the lava dome is big enough we will join them in the field and observe the development directly. We’ll be on standby in case we are needed to evacuate the community” – NGO Vice Head

“The thing is, whatever the issues, we are only focused on the volcano monitoring post in Simpang Empat. So, we hear everything first, we would anticipate information on lahar or any emergency situations. We would help evacuate people and move their stuff to the car. We are never at the back of the line.” – NGO Member
“Whenever there are signs of an eruption, the volcano monitoring posts would give us information on where the wind blows at the time and if the weather is good. However, if the weather is bad or foggy, they couldn’t tell and we would have to check the wind direction ourselves.” – NGO Member

However, information dispersal is not their only job, Beidar was also involved during evacuation and emergency response. Beidar members informed the community about the importance of using masks during ashfall and distributed masks to the communities. They are also involved in the recovery period such as reconstructing communities’ houses and they donated iron sheets to be used as temporary roofing. They often assist in search and rescue, assisting the local disaster management office. Since they are located in the villages, it is easier for Beidar members to be dispatched in the process.

Figure 4. Beidar Posts Location

Beidar was trained for basic information dispersal by the Volcanology Office, but that is not the only training they are equipped with. During a UNDP project, Beidar members also participated in a workshop related to setting up tents in Internally Displaced Persons (IDP) camps and village risk mapping to develop a Village Information System (VIS). They were also invited by the Volcanology Office to meet with similar organizations such as Jalin Merapi and Jangkar Kelud to learn more about risk communication from other organizations that have already been established. They were also trained by HFI (Humanitarian Forum Indonesia) under UN-OCHA.

The organization maintains their independence through self-funding. They rely on members’ donations for tools and uniform procurement. They refused to be funded by the government as this could make them lose their neutrality in doing their job, in the words of the founder, “… the way I see in Tanah Karo, many NGOs and community organizations have a ‘shift of tone’; right now, I can freely complain and criticize the District Head with no burden … we want to give the community the same amount what we are given.”
This view towards the government is apparent in Karo communities, especially in the IDP community, by being independent of government funding Beidar gained more trust from the community.

“I always tell the members, be wary of LKMD if you want to volunteer—Latih Kerih Meling Dame. Latih means tired, Kerih means you run out of money, and you will get yelled at by the mistress a lot. ... we have a joke when a member is MIA for a week, there’s a ‘flying magic jar’ on their home” – Hasron, NGO Founder

Beidar members are predominantly men, as Karo culture has very strong patriarchal values women tend to stay at home and do domestic work. However, there are still some women in the Beidar community, mainly the wives of male Beidar members. These women are usually brought by the male Beidar members to give them an understanding of what the volunteers are working on.

“Here in Beidar we don’t have income; each time we have a gathering we would bring our wife if we are married and donate some of our money to the community ... when a husband earns no income the wife usually gets angry, but by taking her to our gatherings she would understand that this is for the greater good of the community.” – Firdaus, Beidar Vice Head

Hasron claimed that they have communicated the community needs to the local disaster management office but their cries have been left unanswered. This has reinforced their growing distrusts towards authority, however, their history with the Volcanology Office has left them on better terms with this office compared to the Karo District Government. Although Beidar has a close relationship with the Volcanology Office, the Head of the Volcanology post claimed that their relationship is individual, not between organizations. Even though at times Beidar helped them with monitoring, the Volcanology Office believes that they are better suited in information dispersal.

6. Discussions

A thematic analysis of the interviews shows the history of Beidar’s development as an organization proudly independent of the government, the “recruitment” of members, and their important role in the community, especially in risk communication. Beidar is vital as a media between the government (volcano monitoring posts) and the community; their role ranges from monitoring, communication, and evacuation activities (e.g., including search activities after eruptions and lahars), contact and sharing of experiences with similar groups in Indonesia. The limits of their influence in preventing local people from returning to the hazard zone. They fit the key elements of Community-Based Disaster Risk Management (CBDRM) of community ownership; communities as ultimate beneficiaries; education and capacity building; cultural appropriateness; and participation from communities [34]. The case study of Beidar indicates how it provides a model for volunteer groups to emerge as repositories of local knowledge and wisdom, specific monitoring, community liaison, and search skills which address gaps not covered by national and local government organizations or NGOs.

Unlike their predecessors, Jalin Merapi and Jangkar Kelud, Beidar does not have background knowledge of existing hazards as much as the community. The 2010 eruption was a surprise, along with the lack of local public experience, this caused fear and chaos in the community [30]. This served as a challenge for Beidar to set up a whole new system of information dissemination. The lack of preparation for disaster situations and uncertainties reinforces a growing distrust between the Internally Displaced Persons (IDP) communities and the governments, a sentiment which is also shared by Beidar members [35]. The antipathy towards the government and authority makes the people consider Beidar as a more reliable and trusted source of information compared to the government.

The fact that Beidar members are from also part of the community helped them to earn their trusts with information and risk communication. However, the lack of synergy and trust between Beidar, the communities, and the government agencies may become an issue in the future. This situation is different to the case of Kelud, where the synergy between people and the government already existed which led to
zero causalities in the 2014 evacuation. A multi-stakeholder participation and a top-down approach from the local government are vital in ensuring the sustainability and effectiveness of CBDRM such as Beidar that acts during the emergency phase [34]. A collaboration with different stakeholders could develop Beidar and utilize them for different phases in the future such as trainers for evacuation in the preparedness phase or as representatives in planning future volcano evacuation routes with the local Disaster Management Agency.

The high level of trust from the community also created a side-effect of unhealthy dependence. Many of the community members work as farmers and own a farm within the hazard zone. When they see Beidar members standing by on their posts they felt that it is safe enough for them to enter the hazard zone and visit their farmland. The government has failed time and time again to prevent people to steer away from the hazard zone; people are desperate to earn their livelihood. Beidar members are also incapable of forbidding the communities to stay within the hazard zone and can only watch and prepare to evacuate the people in case they receive volcanic activities warning from the Volcanology Office. A skewed sense of safety dawned in the community when they see Beidar member who acts as “watchful protector”, making Beidar only effective in emergency response but not yet in increasing community’s knowledge and capacity in recognizing the danger and risk that lie ahead.

7. Conclusions

This research concludes that Beidar was officially acknowledged as an organization in March 2014 under the wing of the Volcanology Agency. This agency needed help to disseminate information on the volcano status to the community. Hasron, the Beidar founder then recruited local youths to volunteer in passing on the information they receive from the Volcanology Agency through walkie-talkies and radios. The recruited youths are ‘stationed’ in their home village and are responsible for helping evacuate the villagers. Recruiting local youth is seen as a good alternative since the communities—especially the internally displaced persons communities—have little trust in the government due to the crisis and deem them ‘incompetent’. Beidar, as a community-based organization, is able to fill the gap between the community and the government in terms of information dissemination, especially because they are local and are acknowledged as a trusted part of the community. However, this dynamic has a side effect of the villagers’ feeling of security with Beidar ‘watching over them’. This lowers their risk perception of the volcano, causing them to endanger themselves more by entering the hazard area to conduct their day-to-day activity.

Organizations like Beidar are a need-driven system initiated as a bridge between the government (Volcanology Agency) and the community. Their desire to remain independent and politically neutral is a good approach to gain the community’s trust when synergy between community and authority is lacking. Although the organization was started by the Volcanology Agency, its sustainability is upheld by involving local youths that come from villages exposed to the volcanic eruptions. However, the members’ shared negative sentiment of the local government could hinder the disaster risk management in the area. Learning from the evacuation in Mt. Kelud in 2014, a synergy between people and government has granted them zero causalities in the 2014 evacuation. A cooperation between Beidar and the Regional Disaster Management Agency (BPBD) could help improve the community’s resilience even further. Especially with BPBD’s Destana (Disaster Resilience Village) program, Beidar members could be recruited as trainers or hubs to improve preparedness towards future eruptions at the village level.

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