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Collaborative Governance in Merapi Volcano Eruption Risk Reduction in Sleman

Muhammad Mustofa[1] Sri Suwitri[2] Endang Larasati[3] Tri Yuniningsih[4]

[1,2,3,4] *Faculty of Social and Political Sciences, Diponegoro University, Semarang, Indonesia*

**Email : dapdoctor3@gmail.com*

ABSTRACT

After the Merapi eruption in 2010, the community of disaster volunteers in Sleman has grown rapidly, with at least 54 volunteer communities registered with BPBD Sleman. This gives a positive impression that many parties still care and can also ease the government's duties in disaster management. However, this also requires good control and supervision so that the collaboration that occurs can go as expected. This study aims to analyze how the collaborative governance process is in reducing the risk of the Merapi eruption disaster in Sleman Regency. The method used in this research was literature study by looking for references relevant to the problems found. This study found that the collaborative governance process that various parties involved,including the disaster volunteer community in Sleman Regency, was running well. These parties are united in various forums formed by the Sleman BPBD to be coordinated and have the same vision in disaster management. The conclusion from the results of study is that collaborative governance can run well if it has the right place to carry out the same vision so that the expected goals can be achieved.

Keywords*: Collaborative governance, eruption, risk reduction*

1. INTRODUCTION

Indonesia is a country surrounded by a series of active and inactive volcanoes known as the Pacific Ring of Fire. The dangerous condition of the volcano has not been able to discourage people from living around its slopes, as nearly 5 million people live around the slopes of volcanoes in Indonesia. One of the most active and deadly volcanoes in Indonesia is Mount Merapi, with a large eruption cycle of around four years. The Head of the Center for Volcanology and Geological Disaster Mitigation, Surono (2010), said that the eruption of Merapi in 2010 was Merapi's worst disaster since 1870 because 32 villages with a population of more than 70,000 people need to be evacuated because they were in a dangerous zone [1].

The hot launch, known locally as "wedus gembel", reached 11.5 km, requiring all residents who are on the slopes of Merapi to be evacuated and inflicted losses and damage to the surrounding areas namely Magelang Regency, Klaten Regency and Boyolali Regency (Central Java Province) and Sleman Regency (Special Region province of Yogyakarta). The problem that arose at that time was the large number of refugees, the refugees in Sleman Regency reached 150,000 people spreading across 553 evacuation points in 17 sub-districts. The life toll reached 346 people, nine of them were toddlers and 2682 families lost their living [2]. Another problem is that refugee management has not been conducted optimally. Overload shelters, uneven aid and refugee barracks where there is no separation between men, women, children and the elderly, resulting in psychological and health impacts on the refugees are the various problems encountered when evacuating from Merapi in 2010. During the evacuation process many families are separated and it is quite difficult to find their families at the evacuation site [3]. There is even a group of people who feel marginalized so that they can neither help nor provide assistance in the event of Merapi eruption [4].

After the Merapi eruption in 2010, the Sleman Regency Government made several changes related to the disaster management of Mount Merapi eruption. The Local Government through the Regional Disaster Management Agency (BPBD) of Sleman Regency made several strategic steps in efforts to reduce the risk of disaster in Sleman Regency including:

1. By 2021 the entire village in Sleman Regency has become "*Desa Tangguh Bencana* (Resilient Disaster *Village*)"

2. Establishment of operational units at the sub-district level and implementing units at the village level.

3. Facilitate and coordinate with stakeholders regarding disaster management.

4. Increase participation and participation of community and business world in disaster management in Sleman Regency.

Regional Medium Term Development Plan Document (RPJMD) of Sleman Regency in 2016-2021 states that disaster management in Sleman Regency is still constrained, among others, related to:

1. Residents who still insist on staying in disaster-prone areas set by the government,

2. Not all citizens are trained for disaster response,

3. The availability of disaster facilities and infrastructure is inadequate,

4. There are still disaster prone areas that have not been installed *ews* and there are still evacuation roads that are damaged.

5. People's ability to reduce disaster risk still needs to be improved.

Merapi eruption in 2010 also gave rise to the phenomenon of the emergence of disaster volunteer community in Sleman Regency. BPBD Sleman Regency noted there were 54 volunteer communities that have been established after the eruption in 2010. In addition, BPBD Sleman Regency also has formed partners such as *Desa Tangguh Bencana* (DESTANA), operational unit and disaster management unit, and BPBD Rapid Reaction Team (TRC). All parties have the same goal of helping disaster management in Sleman Regency.

This can basically be a positive capital in disaster management. The more those involved, the greater will be the help given to the government to identify and target problems so that it can produce the right and effective policies. The number of parties involved can lead to learning and sharing experiences to combine relevant skills and capacities later. However, this can also have an impact on the feeling of loss of control in influencing policy for the dominant party. In addition, it can also blur the line of responsibility as well as the slow decision-making even failing in decision making due to the egocentric attitude of each party. It is, therefore, necessary for effective and intense collaboration to maintain the relationship between the parties involved.

Based on this explanation, the formulation of problem in this study is how to collaborate in reducing the risk of volcano eruptions in Sleman Regency?

2. LITERATURE REVIEW

Collaboration is important in disaster management because disasters do not recognize territorial and administrative boundaries. In addition, government-established institutions sometimes have not been effective in disaster management due to human resource shortages, conditional funding and rigid regulations [5]. Therefore, efforts are needed to reform disaster management. Howes [6] reveals at least five things related to disaster risk reduction reform to be effective: 1) developing a shared vision, 2) adopting multi-level planning, 3) integrating the Act, 4) Network of collaboration organizations, 5) establishing a cooperative funding model.

The success of collaboration in disaster management can be seen in some previous studies, where the research was also used as a reference and comparison in this study. Research on collaboration in disaster management has been widely conducted by previous researchers. Research on multistakeholder collaboration in flood risk reduction in Cape Town, South Africa found that barriers to collaboration came from the government itself and the emergence of a sentiment of distrust in the perception of others [7]. Factors hampering the implementation of collaboration in flood risk reduction in Cape Town, South Africa are the dominance of technocratic approaches, lack of certain capacity, challenges on how to share risk, and short-term political contestation [8].

Japan as a developed country in disaster management has conducted well collaboration between the government and the private sector as did the Matsushima City government and hotel entrepreneurs in the city. Nguyen [9] found that collaboration took place between hoteliers and government in Matshushima City through the division of duties between the government and hospitality entrepreneurs in the event of an earthquake, in which hotelier is willing to use the hotel as a place to evacuate in the event of an earthquake and the government is tasked with providing refugee logistics.

Lori Pennington Gray [10] conducted a research in Bali, Indonesia, related to communication collaboration between Bali Hotels Asosiation and Bali Local Government. The two sides work together on a tsunami early warning system to maintain the safety and comfort of tourists. The study concluded that well- established collaboration was able to address problems in disaster risk reduction in this case communication problems. Annisa Gita Srikandini [11] conducted research on disaster risk reduction in Indonesia and in Myanmar and found that both countries have placed disaster risk reduction inclusively. However, disaster risk reduction implementation has not been able to establish collaboration based on a shared vision so it has not had a significant impact.

In the case of mount Merapi eruption disaster, at the time of the eruption in 2010 the implementation of

collaboration handling the impact of merapi eruption still experienced problems regarding logistical assistance that has not involved competent parties in logistics affairs [12]. A strong partnership approach between governments, NGOs, and communities in making policy is necessary to improve local coordination and capacity in disaster risk reduction [13]. Vertically and more broadly consolidated collaboration is needed in tackling complex issues [14].

The importance of collaboration in disaster management is in line with the current paradigm shift in governance. Government constraints on resources demand more of the role of non-governmental elements so that collaborative governance is formed. Collaborative governance is essentially intended to unite stakeholders, private and community in a formal forum so that collaboration can be interpreted as cooperation. Cooperation means activities or efforts made by several people (institutions, governments, etc.) to achieve common goals. Experts often use different terms but in the same sense, for example, participatory management, participatory governance, collaborative governance, sound governance and collaborative management. Ansell and Gash [15] define collaborative governance as an arrangement that governs one or more public bodies and directly engages non-state stakeholders in a formal, conservative, deliberative collective decision-making process and aims to create or implement public policy or manage public programs or assets.

O'Flynn and John Wanna [16] define collaboration as a form of working together or working with others by engaging actors (individuals, groups or organizations) who cooperate in multiple efforts. Further, O'Flynn and Wanna divide the form of collaboration into four types: 1) Collaboration in government, involving various agencies and people, 2) intergovernmental collaboration, involving agencies of various jurisdictions, 3) Collaboration between governments and third party (external) goods and service providers, and 4) Collaboration between governments and citizens (individuals).

The desire to carry out collaboration can be made a pattern based on the context and objectives of individual stakeholders. Judging by the power dimension, collaboration can be done because of the forceful power boost that is forced to do collaboration and collaboration due to volunteering to collaborate. At the commitment level, there is a desire for meaningful and substantive collaboration as well as a pretend desire for collaboration. For context and purpose of cultural internalization, collaboration can be in the form of the development of collaboration culture or philosophical commitment in collaboration and the desire to use collaboration only as a tool and instrument to run the modus operandi stakeholders by not having a commitment to collaboration.

Then, some use collaboration because it is judged to have positive benefits and activities and some otherwise view collaboration as an unhelpful activity and do not provide benefits. This is included into the context of strategic dimensions. Collaboration is also considered as a means, process and result of each party's wishes. The objectives of each party in collaborating also vary. There are parties who make collaboration a common goal and intention so as to create an agreement. But there are also those who consider collaboration to be competitive and participation has different objectives.

Furthermore, in terms of visibility and awareness, collaboration is open and published so as to foster a heightened awareness of the need for collaboration. But there are also collaborations with confidentiality and behind-the-scenes play creating a lack of awareness in collaborating. The last dimension, problem applicability, encourages collaboration in a simple form accompanied by simple goals and responsibilities as well. But there is also collaboration based on evil desires and opposing solutions and descriptions.

Each of cooperation is conducted with different terms and conditions. Wildavsky (1973) said that collaboration and coordination involve different dimensions and these dimensions do not always complement each other, in accordance with mutually agreed terms and conditions. Some dimensions of the collaboration are:

1. Collaboration is a form of cooperation in building common ground, improving consistency and aligning activities between actors.

2. Collaboration can be a negotiating process to compromise each other until an agreement is reached.

3. Collaboration can enhance the role of supervision, inspection, joint activities and centralized coordination.

4. Collaboration can increase power and coercion, the ability to impose their own results or preferences on others to some extent with the compliance or involvement of actors.

5. Collaboration can enhance future goals and commitments, prospective behavior, planning or preparation to align activities.

6. Collaboration can involve the development of internal motivations and personal commitments to projects, decisions, organizational goals or strategic objectives.

7. Collaboration can be in the form of cooperation contracts and reciprocal partnership relationships.

Based on the above reference, the collaborative governance concept used by Ansell and Gash will be used as a reference for this research. The concept is considered to explain collaborative governance in reducing the risk of volcanic eruptions through six criteria that must be met in collaborative governance [15]:

1. The Forum is initiated by public institutions.
2. Participants in the forum include non-public actors.
3. Participants are directly involved in decision making and not only consulted by public institutions.
4. Forums are formally organized and meetings are held collectively.
5. The Forum aims to make decisions by consensus.
6. The focus of collaboration is public policy or public management.

Disaster, according to the law of the Republic of Indonesia number 24 of 2007 on disaster management, is defined as an event or series of events that threaten and disrupt people's lives and livelihoods caused, either natural and/or non-natural factors or human factors resulting in human fatalities, environmental damage, property losses, and psychological impacts. In general, disasters can be categorized into two kinds:

1. Natural disasters, disasters caused by natural phenomena such as earthquakes, erupting mountains, tsunamis and putting pickaxes.
2. Non-natural disasters, disasters that are at least caused by human behavior and activities such as landslides, floods, and forest fires.

The Asian Disaster Reduction and Response Network (ADRRN) divides hazard threats into the following categories:

1. The threat of biological hazards is a threat caused by processes or phenomena that are organic or expressed by biological vectors, including exposure to micro-organisms of a pathogenic nature, toxins and bioactive materials that could cause disasters for humans, the environment and other living beings. The examples are epidemic diseases transmitted through plants or animals and infection.
2. The threat of geological hazards is a threat of danger caused by geological phenomena or internal processes of the earth, such as earthquakes, volcanic activity and emissions, as well as the absence of related geophysical processes.
3. The threat of natural hazards is the threat of danger posed by natural processes or phenomena.
4. The threat of socio-natural hazards is a phenomenon of increasing the incidence of certain geophysical and hydrometeorological hazard events as a result of excessive use of land and environmental resources and inflicting damage such as landslides, floods, landslides, and droughts, resulting from human activity in exploiting environmental resources.
5. The threat of technological hazard is a threat of danger stemming from the failure of technology or industry by humans, which can lead to fatalities, social and economic disruptions, and environmental damage. Those included in the threat of technological hazards are industrial pollution, nuclear radiation, toxic waste, reservoir collapses, transportation accidents, factory explosions, fires and chemical leaks.
6. The threat of hydrometeorological hazards is atmospheric, hydrological or oceanographic processes or phenomena that could lead to loss of life, property damage, social and economic disturbances, or environmental damage. Examples of hydrometeorological hazard threats are tropical cyclones, thunderstorms, ice storms, tornadoes, droughts, heatwaves etc.

Based on the explanation above, the eruption of Mount Merapi can be categorized into a natural disaster with the threat of hydrometeorological hazards. During the eruption, Mount Merapi will be very dangerous for living creatures and the surrounding environment because the eruption will produce the following dangerous things:

1. Volcanic gases such as carbon monoxide (CO), Carbon dioxide (CO2), Hydrogen Sulfide (H2S), Sulfur Dioxide (SO2) and Nitrogen (NO2) that can harm living creatures, especially humans.
2. Lava accompanied by sand and hot stones. Lava is a very high temperature magma liquid that comes out to the surface of the earth and can be diluted and viscous.
3. Lava mixed with rocks, water and other materials.
4. Ash rain is a very fine material and can be carried by wind up to hundreds of kilometers. Ash eruptions can interfere with breathing.
5. Hot clouds are the result of eruptions flowing like clouds and contain particle, hot incandescent rocks and volcanic material with temperature of higher than 600^0C causing severe burns. The threat of hot clouds is the most popular and very damaging threat from Mount Merapi. The phenomenon of hot clouds of Merapi volcano is often referred to by people around the slopes of Merapi called "wedus gembel".

3. METHOD

This study used a method of studying literature by looking for references relevant to the problems found. This reference will be used as a basic foundation and a key tool for research practices in the field. This study used a qualitative analysis technique with a descriptive approach. John W Creswell [17] defines qualitative research as

research that begins with the assumption and use of the interpretation/theoretical framework that shapes and influences the study of social or human problems. The approach used in this study is a case study approach because Mount Merapi has unique characteristics of other volcanoes in Indonesia. Miles, Huberman and Saldana [18] argue that data analysis in qualitative research is done in three steps: data condensation, presenting data and drawing conclusions. The data collected will be selected, and then the research will focus on the data corresponding to the problem. Furthermore, the data will be summarized and simplified to be displayed then and draw conclusions.

This research took place in Sleman Regency, Special Region of Yogyakarta. This location was chosen because Sleman district is the area affected mostly by Merapi eruption in 2010. In addition, this area also has a large number of affected populations compared with other areas. The growth of volunteer organizations is also quite a lot in this area. This research was only done with documentation studies finding how to collaborate in the reduction of the risk of Mount Merapi eruption disaster in Sleman Regency.

4. RESULTS AND DISCUSSIONS

4.1 Merapi Disaster Prone Areas

Mount Merapi is one of the volcanoes in Indonesia with unique characteristics. Merapi has a large frequency of eruptions in the four-year cycle. Mount Merapi is also one of the most active mountains in the world, but this does not discourage people from staying around the slopes. This is certainly potentially against the vulnerability posed. Therefore, volcanoes are closely monitored and regularly in order to minimize the impact when at any time the volcano erupts. While the mountain "sleeps" people can do normal activities around the slopes, but if the mountain "wakes up" the community is required to be vigilant until evacuation. The determination of mountain status by the Geological Agency of the Ministry of Energy and mineral resources is as follows:

a. Level I is a normal condition, where there is no volcanic activity in the volcano.

b. Level II or alert condition, there is activity in the volcano but will not affect the environment.

c. Level III or standby condition is an increase in volcanic activity and all elements are prepared for evacuation measures.

d. Level IV or alert condition is the one requiring all communities in hazardous areas to be evacuated immediately because the volcano has erupted or will erupt.

The status of the mountain has an impact on government policy and community activities around the mountain side. In normal conditions (level I) and alert conditions (level II) people can do activities as usual. For standby conditions (level III) all resources are conditioned to be prepared to evacuate, the community is prepared for the evacuation process. Governments at this level have begun to prepare for the worst possibility. Then for the condition of caution (level IV), the mountain is erupting and all residents should be evacuated for the sake of safety. The government and all relevant elements immediately evacuated all communities affected by the eruption.

In an effort to protect the public from the threat of Mount Merapi eruption, the Sleman Regency Government has determined the area around the slopes of Merapi volcano to be a disaster prone area. These areas include:

1. Merapi III Disaster Prone Area is an area that is close to the source of danger that is often hit by hot clouds, lava flows, rock fall, rock ejection (incandescent), and heavy ash rain. KRB III covers the sub- districts of Turi, Pakem, Cangkringan, and Ngemplak with a 4,672-hectare area.

2. Merapi II Disaster Prone Area is an area that has the potential to be hit by mass flows in the form of hot clouds, lava and lava flows, as well as ejects materials and (incandescent) rock. KRB II covers Tempel, Turi, Pakem, Cangkringan and Ngemplak sub-districts with an area of approximately 3,273 hectares.

3. Merapi I Disaster Prone Area i.e. areas potentially hit by lava / flooding and likely can be exposed to the expansion of heat clouds and lava flows. KRB I consists of Tempel, Pakem, Cangkringan, Ngemplak, Ngaglik, Mlati, Depok, Kalasan, Prambanan, and Berbah sub- districts with an area of 1,371 hectares.

4.2 Collaborative governance in Reducing the Risk of Merapi Eruption disaster in Sleman Regency

Each disaster event has its own characteristics so that the risk reduction measures are different from one disaster to another. In terms of disaster management generally, the Sleman District Government already has a law protection in the form of local government regional Sleman Number 7 year 2013 on disaster management. Based on the Regional Regulations, disaster management in Sleman Regency must prioritize the principle of disaster risk reduction. In addition, disaster management in Sleman has fast and precise principles, priorities, coordination and coordination, usability and success, transparency and accountability, partnerships, empowerment, non-discriminatory, non-proletarian, local wisdom, rebuilding in a better, sustainable direction. Disaster management implementation aims to implement disaster management in

a planned, integrated, coordinated, comprehensive and sustainable manner in order to provide the community with protection from threats, risks and disaster impacts. The Regional Regulation also expressly states that disaster management is the responsibility of the local government and implemented by the Regional Disaster Management Agency (BPBD).

BPBD Sleman Regency has taken several measures related to efforts to reduce the risk of volcano eruptions, one of which involves various parties in disaster risk reduction. Using the principles of collaborative governance Ansell and Gash obtained the following results:

4.2.1 The Forum is initiated by public institutions.

BPBD Sleman Regency initiated the engagement of several agencies in disaster management, among others:

a. Disaster management operational unit (Ops Unit. PB)

The disaster management operational unit (Ops Unit) is based in the Sub-District. The establishment of ops unit was carried out by the Chief Executive of BPBD. The board is formed through deliberations at the Sub-District level where the results of the deliberations will be proposed by the District to the Chief Executive of BPBD to be confirmed. This unit is under coordination of and responsible to the Chief Executive of BPBD. Ops units are led ex-officio by Chief of Sub-District (*camat*). Elements of the ops unit consist of sub-district, military rayon command (koramil), police (police sector) and community volunteer disaster management.

b. Disaster management unit (Laks Unit PB).

The unit is based at the village level and is led ex-officio by the village chief. This unit is under the coordination of operational units and is operationally responsible to the Chief Executive of BPBD. The board was formed through deliberation of the disaster management element in the village which was then proposed to the chief executive of BPBD. The unit consists of elements of the village government, a military rayon command represented by Babinsa, a sector police force represented by Bhabinkantibmas, as well as a community of disaster management volunteers in the village.

c. Sleman Volunteer Community Communication Forum (FKKRS)

FKKRS is a platform uniting all volunteers engaged in disaster management in Sleman Regency. This forum was initiated by BPBD Sleman, intended to be a forum for a large community of Disaster Management volunteers in Sleman to be co-urged and to have the same goals and views on disaster management. This forum also provides convenience for BPBD Sleman in gathering and coordinating with various volunteer communities.

d. *Desa Tangguh Bencana* (DESTANA) and Disaster Risk Reduction Forum (FPRB)

The establishment of *Desa Tangguh Bencana* (DESTANA) refers to the Regulation of the Head of BNPB No. 1 of 2012 on General Guidelines for Villages / *Desa Tangguh Bencana*. Perka BNPB regulates the establishment of DESTANA based on the principles of disaster is a joint affair, based on disaster risk reduction, fulfillment of people's rights, society being the main actor, done participatory, local resource mobilization, inclusive, humanitarian basis, justice and gender equality, siding with vulnerable groups, transparency and accountability, partnership, multi threat, autonomy and decentralization of government, compacting into sustainable development, and organized across sectors.

DESTANA should also be followed up with the establishment of disaster risk reduction forums (FPRB) in each village. FPRB is a place for all elements in the village to participate in disaster management efforts in their area. For Sleman Regency, BPBD has a target all villages in Sleman Regency have formed DESTANA and by 2019 have formed 48 DESTANA until 2021. Not all of these DESTANA have established FPRB; there are still 13 DESTANA that have not formed FPRB.

4.2.2 *Participants in the forum include non-public actors.*

Participants involved in BPBD Sleman institution have engaged various non-governmental elements. Non-public actors are actively and directly involved in various disaster management activities. Even the role of non-public actors in disaster management is expressly included into various Articles in Regional Regulation of Sleman District No. 7 of 2013 on Disaster Management. This is the foundation for everyone or agency to be involved in disaster management in Sleman Regency according to their capacity and capabilities.

4.2.3 Participants are directly involved in decision making and not only "consulted" by public institutions.

The involvement of the community, agencies, and agencies in disaster management in Sleman Regency is not only limited to "joyous". All of those involved in the action have equal opportunities and rights in decision-making. This is seen from the self-sustaining activities carried out by the community in an effort to reduce the risk of catastrophic eruptions. The determination of the route and purpose of community evacuation is the result of deliberation between the affected communities, safe zone

communities and BPBD. In addition, BPBD Sleman opens up space to everyone, communities, institutions and agencies to provide advice and input on various disaster management activities of Merapi eruption.

4.2.4 Forums are formally organized and meetings are held collectively.

The cooperation forum established by BPBD Sleman has been formally organized through the Regent's Regulation and the Decree of the Head of BPBD Sleman. Operational Unit and Disaster Management Unit were established based on Regent Regulation No. 62 of 2015 on The Establishment of Operational Units and Disaster Management Units. The Sleman Community Communication Forum already has an article of association and by-budget as guidelines for implementing the forum's kegiata. Destana as bpbd's main partner was established based on PERKA BNPB and further determined by the decree of the chief executive of BPBD.

4.2.5 The Forum aims to make decisions by consensus.

The cooperation forum established by BPBD Sleman has intended to assist the government in disaster risk reduction efforts. The forum makes decisions based on the results of joint deliberations. The implementation of the decision was carried out jointly by all parties involved in the deliberations.

4.2.6 The focus of collaboration is public policy or public management.

BPBD Sleman's collaboration with non-Governmental parties in Merapi eruption disaster management focuses on disaster mitigation efforts. Volcanic eruptions are not preventable but the impact of such eruptions can be avoided. Therefore, BPBD Sleman made efforts to reduce the risk, especially the risk of fatalities. These efforts include cooperation with the Center for Research and Development of Geological Disaster Technology (BPPTKG) Yogyakarta to supervise the activities of Mount Merapi so as to provide accurate and quick information to all communities around the slopes of Mount Merapi regarding the status of mount merapi. In order to evacuate the community, BPBD Sleman has been working with the community of volunteers and the community around Merapi volcano in determining evacuation measures if necessary. In addition, the evacuation route of each village has been determined jointly as well as the evacuation location, so that the evacuation is more coordinated and orderly. So, it can be concluded that the focus of collaboration in disaster risk reduction of Merapi eruption is on public management related to evacuation and evacuation issues.

4.3 Mount Merapi Eruption PRB Strategy

Disaster management maintenance is divided into three stages, namely pre-disaster, emergency response, and post-disaster. In pre-disaster stage, disaster management includes no disaster situation and there is a potential for disaster. For the risk reduction activities of mount Merapi volcano eruption, the Sleman district government has the following strategies:

1. Control activities in disaster prone areas to reduce the risk threat. At the time mount Merapi is on standby level all activities in KRB III that are still inhabited should not be carried out except activities in order to handle disasters.

2. Tighten building and environmental arrangements in disaster prone areas. KRB III area is prohibited from carrying out development activities and even some areas in KRB III are no longer allowed for occupancy and the community has been relocated to a relatively safer area. Areas that can no longer be residential areas are areas in Cangkringan sub-district including:

    a. Umbulharjo Village : Padukuhan Palemsari and Pangukrejo

    b. Kepuharjo Village : Padukuhan Kaliadem, Petung, Guava, and Kopeng

    c. Glagaharjo Village: Padukuhan Kalitengah Lor, Kalitengah Kidul and Srunen.

3. Develop facilities and infrastructure to reduce the risk of disaster. This activity is in the form of evacuation routes and evacuation barracks to make it even better.

5. CONCLUSION

In principle, the local government of Sleman Regency has engaged various parties in efforts to reduce the risk of volcanic eruptions. The principle of collaborative governance has been implemented by establishing various formal forums in disaster risk reduction efforts and actively engaging various parties in the forum. Collaboration will work well if each of collaboration participants participates actively in cooperation activities. Advice is given to various parties involved in reducing the risk of Merapi disaster in Sleman to participate actively in various collaboration activities carried out.

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