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SWOT assesment of the community potency to determine the strategic planning for volcano eruption disaster management (Case study in Cangkringan, Yogyakarta province)

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Abstract

Disaster is an event that cause people loss their life, properties, resources and also give a phycological impact. Disaster is divided into two types. The first type is natural disaster and the second type is man-made disater. One of the natural disaster in Indonesia is volcano eruption. Indonesia has a lot of active volcano and one of the most active is Merapi Volcano which located in Yogyakarta Province. In the late of October 2010, Merapi Volcano has a fairly large eruption continued with the emerge of lava flow. This disaster left at least 165 people dead and there are 225.000 people have to be evacuated.

Merapi eruption disaster shows the importance of disaster management in saving people's life. Disaster management is not only a government's obligation but it is also the obligation of the community. Community-based disaster management in the region of Merapi Volcano becomes the most important tool that have to be developed. Community has a good local knowledge of the region so that the disaster management conducted by the local community will be more efective and eficient.

This research's aim is to analyze the SWOT factors (Strengths – Weakness – Opportunities – Threats) of the local community to determine the internal and external factors that exist in the community. These internal and external factors can be analyzed and developed to provide a strategic planning of disaster management system in accordance with the conditions of the surrounding community in Merapi Volcano region.

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Keywords : Volcanic eruption, SWOT , local community, strategic planning , disaster mitigation, Cangkringan

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1. Merapi Volcano

Merapi Volcano is one of the world's most active volcanoes. It contains an active lava dome which regularly produces pyroclastic flows and it has produced more pyroclastic flows than any other volcano in the world so it will be very dangerous for the people who live in Merapi Slope when the eruption occurs. Eruptions occur at interval of 1-5 years. Volcanoes deal out overwhelming doses of energy that no human can survive. Mount Merapi is one of the active volcanoes. Direction of the eruption of Mount Merapi always changing. Since 1961 eruption of Merapi direction leads to the southwest toward the headwaters and streams Kali Senowo. The next eruption occurred in 1986,1992,1994,1997,2001 and 2006. After the activity of Merapi eruption in 2006, the opening crater turns to the southeast and east so that the flow of hot lava and hot clouds toward Kali Gendol and Kali Opak in Sleman. Sediment yield eruption upstream Gendol and opaque 3.5 million m^3 and Gendol river basins in raidus 6 km from the summit largely been filled with volcanic deposits cause cold lava flood threat increases. Avalanche of the lava dome at the summit with heavy rains would trigger a flood of cold lava that has high destructive power.

The existence of communities living and residing in the slopes of Merapi, such as in Cangkringan is a distinct danger to the people itself. The area is a dangerous zone and often become the worst affected zone when Merapi eruption occurs. Cangkringan is one of the most dangerous zone of Merapi eruption , so it is not surprising that the highest number of Merapi eruption victims comes from this area.

Based on the observation, there are five village in Cangkringan that affected the direct impact of Merapi erution. Those village are Kepuharjo, Umbulharjo, Wukirsari, Agromulyo dan Glagaharjo. The number of victims affected by the eruption of Merapi in Cangkringan district caused by an inaccuracies in the data about peta KRB-Kawasan Rawan Bencana (disaster-prone-area-map) which made by the government. The existing KRB map is no longer considered within the condition of Cangkringan theritory today, in addition to the intensity of the larger eruptions also affect the level of inaccuracies of the existing KRB map. Merapi eruption in 2010 occurred at night, making people difficult to save themselves. Most of the people were home and asleep when the eruption occurred despite the fact that evacuation routes have been provided by the government but because of the eruption happened so quickly so it makes people panic. When Merapi eruption occurs, the cold lava flood participate out of peak trim and flowing in the rivers around Mount Merapi and caused 3023 houses have to be relocated. The victims whose houses were destroyed by the impact of the eruption are given temporary shelters made by the government in the safer location and outside the hazardous zone of Merapi.

2. Community Based Disaster Management

Disaster management is a process which implemented in any type of catastrophic event to save people from the disaster impact. Sometimes , it referred to as disaster recovery management, the process may be initiated when anything threatens to disrupt normal operations or puts the lives of human being at risk. Government on all levels as well as the local cummunity can create a disaster mitigation planning to overcome the disaster and return to the normal function as quickly as possible. Local community is a group of interacting people sharing an environment. In human communities, intent, belief, resources, preferences, needs, risks and a number of other conditions may be affecting the identity of the participants and their degree of cohesiveness. This local community will take an important role in a disaster management system.

This Research uses the qualitative descriptive method with the approach of observational by RRA (Rapid Rural Appraisal) and interviews to collect the data. Research subjects are locals, head of the region and community figures as an informant triangulation by using the SWOT (Strengths – Weakness – Opportunities – Threats) matrix analysis. SWOT analysis will generate internal factors (strengths and weakness) and external factors (opportunities and threats) . The result of internal and external factors will be used as an analysis tools and parameter to determine the strategic planning of the community-based disaster management.

Observational approach by interviewing is the best method to collect the data from the local community to understand their feeling and opinion about the disaster. This interview uses a questionare which completed by a specific question which clasified each other based on the information indicators. The questionare contains some questions to get the information about the SWOT factors (Strengt-Weakness-Opportunity-Threats). There are six parts of indicators on the questionare. Those indicators are knowledge about disaster risk, behaviour and attitude to face disaster risk, availibility of physical infrastructure, availability of social organization/institution, external environmental factors and disaster risk reduction behavior. Those components are used as a tool to examining and analyze the local commmunity condition of facing the Merapi eruption disaster. The subject of interview are local people who affected by the eruption , local governement and head of a social organization/instituion. By identifying data, the SWOT components can be determined based on the result of the interviews conducted in Cangkringan local communities.

The most important part of analyzing the SWOT components is making a strategic planning of disater management based on the data to reduce the risk disaster in the communities. The following steps outline are what should be done when conducting strategic planning (Kaufman and Herman 1990): (1) Select the type of strategic planning; (2) Identify beliefs and values; (3) Identity visions; (4) Identify current missions; (5) Identify matches and mismatces; (6) Reconcille differences; (7) Select a preferred future; (8) Identify missions; (9) Identify strenghts; (10) Derived decicions rules; and (11) Develop strategic action plans. The needs, visions, beliefs and missions are integrated. Based on the SWOTs and the decision rules, this step answer the key questions : What ? How? Who? When? Why? Where? It is at this step planners identify outcomes, related outputs, and products. (Roger Kaufman 1992). A community-based planning is the planning that fully reflect the needs of society in the drafting process.

Disaster management is designed for disaster risk reduction activities. Natural disasters (natural factors that have become characteristic of Indonesia) that occur and override the population can not be avoided anymore. Effective risk management requires information about the magnitude of risk faced (risk assessment), and how much interest by the community to reduce the risk (risk evaluation). Measuring the level of risk is an important aspect of preparedness planning and mitigation planning. Risk reduction can be done in many efforts to mitigate / taming natural disasters. Risk analysis can be done for the introduction of the characteristics of the disaster threat, the vulnerability of community and the introduction of community capacity. Disaster mitigation is basically divided into two kinds of mitigation consisting of physical and non-physical mitigation. Physical Mitigation is the effort of disaster management by providing physical facilities that can be used to face the danger of disaster while non-physical mitigation is mitigation that aims to protect and enhance the preparedness of communities so that the risks can be minimized. Some examples of physical mitigation measures such as setting up a means of communication such as HT (Handy Talky), Early Warning Systems (EWS), evacuation roads, barracks, a protected space and the installation of emergency disaster information network while non-physical mitigation measures such as increasing the capacity of the community, SAR (Search and Rescue) training, rehearsal field, document preparation of disaster management, community facilities and emergency response command post.

By looking at the results of the questionnaires existing knowledge about disaster risk indicators, behavior and attitude to face disaster risk, availibility of physical infrastructure, availability of social organization / institution, external environmental factors and disaster risk reduction behavior, Cangkringan people in general understand that they are living in disaster-prone areas, and they also know what kind of disaster risks that can threaten their lives. Merapi eruption that often occurs once in every five years becomes a habit that has to be accepted by the community and they do not intend to move because they already feel comfortable staying there, and most of their livelihood was centered in Cangkringan. Experience of facing Merapi eruption from the previous years make people understand and knowledgable about disaster mitigation and the also know what should they do when the eruption occur. People know the basic things to do for doing the mitigation process such as a rallying point to gather and

prioritize evacuated children and women when the evacuation process. Based on the availability of physical facilities and infrastructure supporting disaster mitigation activities, generally in every village has been equipped with EWS (Early Warning System), Handy Talky, evacuation routes and vehicles such as trucks that are ready to use for the evacuation and most people also have personal motorcycle which can be used but for the first aid facilities are not yet available complete.

Organizations and community institutions still in low quantities though there are several social communities that formed itself in the community but has not been well coordinated each other. External impacts that felt by the community when disaster occurs generally in the form of physical effects such as public health affection. At the time of the eruption occurred many people suffer from shortness of breath nor when they were in the refugee's shelter, people often suffer from digestive disorders and skin problems due to the limited availability of clean water. The efforts made by the government to carry out simulations of disaster mitigation in Cangkringan also not received active response from the public, only few people are following the activities of the simulation because the majority of people can not leave their work for granted so that the existing mitigation simulation efforts are still not optimal .

Fig.1. (a) Construction of permanent housing Pagerjuang 1 (Source: Binta, 2012)

(b) Construction of permanent housing Pagerjuang 2 (Source: Binta, 2012)

Disaster management in the District Cangkringan nowadays has already complete by a good standard such as Early Warning Systems (EWS) installed on street corners are directly connected to the BMKG (Climatology and Geophysics Agency), as well as CCTV BPPD. Early Warning System can function efficiently if the warnings received by people come faster than the approaching danger. EWS system consists of monitoring systems, control systems and conveyor systems. Monitoring system is a system that monitors natural phenomenon of disaster condition. The control system in master control that will process data monitoring and decide the danger level while the conveyor system in the form of a siren placed in residential communities prone to disasters. When the eruption occurs at a certain intensity that is considered dangerous, immediate early warning system automatically emits a siren to alert the entire community to come together in the next rallying point for evacuated together. A lot of Merapi eruption victims in Cangkringan area is also due to a belief that local people still hold and fully believe in the local community leaders such as the head of the hamlet / village.

Fig.2. (a) SAR Training 1 (Source: Yusafat, 2011)

(b) SAR Training 2 (Source: Yusafat, 2011)

Some heads in the district hamlet Cangkringan still survive and believe that their homes are safe from harm but Merapi danger zone increases with time so they homes are not in the safe area anymore. Improved status of Merapi danger is also done in a short time so that some people have not been displaced. Communities in Cangkringan is traditional society that often see the signs of nature as their reference to decide the eruption occurred for example by looking at the number of animals coming down from the mountain and into the village. Natural signs such as this is often a reference to do the evacuation. There are also people who are reluctant to evacuate because of the eruption in 2006, a place where they lived is included in the safe zone, but in fact when the eruption occurred in 2010, a place where they lived is no longer get into the safe zone but it has been included into the danger zone of Merapi eruption.

Fig.3. Community Business Unit

The whole entire refugees living in shelters have gained permanent residence in a safer area, but there are also some refugees who are reluctant to stay in permanent housing provided by the government and they chose to return to their original homes even though the area is belonging to the hazardous region. There are many reasons that make people do not want to move into a permanent housing provided by the government. One of the reason is because the permanent residential building is smaller than the houses that they already have. The process of building permanent housing for victims of Merapi involve many parties and not just the local government such as BNPB (National Disaster Management Agency), PSF (PNPM Support Facility) and the Department of Public Works. Permanent housing built by the government can be categorized as a very feasible permanent residence because the government is not only build a house but they build the residential areas of the complex complete with a variety of existing facilities such as hydrants environment, wind breaker, lightning tower , green open space which is used as a rallying point in the event of a disaster and evacuation routes. Some permanent housing can already be occupied but others are still in the process of development that is expected to be completed in December 2012.

Table 1. SWOT Analysis

STRENGTH	WEAKNESS
• Cultural cooperation and mutual assistance in the community. • Patience and optimistic nature of the society. • Community are easy to be influenced and nurtured. • People believe and obey the leader of the village / hamlet. • The willingness of community to make their life (social and economic) better. • Communities have the organization or social group for disaster management. • Facility of physical and non-physical disaster mitigation have built in their settlements.	• Communities still adhere to traditional beliefs. • People put less trust to the government. • People unwilling to evacuate early. • People do not easily adapt to the new environment (shelter). • People unwilling to follow the dissemination or simulated disaster mitigation. • People face the traumatic effects of disaster. • Low levels of education. • Low income.
OPPORTUNITY	**THREATS**
• The location is close to the research and higher education institutions. • Merapi eruption became the government's main disaster discourse. • Merapi become a disaster assessment center for scientists and researchers. • Lots of help and counseling that comes from the private sector. • Many volunteers from within the country and abroad who are willing to help. • Abundant natural resources and a fertile soil due to eruption.	• Merapi eruption is inevitable annual cycle. • Inadequate refugee shelters. • Lack of coordination between the central and the local government about the distribution of aid. • Documenting the ownership of land is slow, emerge difficulties in the compensation process.

Based on the information obtained through observation, in Cangkringan itself has many communities that voluntarily trim responsive and worked together to monitor the activity of the volcano from day to day such as AMC (Agro Merapi Community) initiated by the Cangkringan people themselves without any interference from the government . AMC was established since the eruption in 2010, which indirectly inspire the hearts of the youth in Cangkringan to participate in the process of disaster mitigation. Some of the activities undertaken by the AMC is to minimize disaster risks such as continuously monitoring an activity of Merapi eruption and monitoring the direction of the movement of cold lava which at times can lead to a settlement area residents. At first, members of the AMC team consists of only a few people but over the time the number of AMC members increase. Other AMC activities also include simulated of disaster mitigation, training SAR (Search and Rescue) and hazard socialization. Outreach activities aimed at disseminating the hazard posed by the occurrence of natural events such as Merapi eruption accompanied by heat clouds that can endanger the lives of the people who live and move in areas prone to disasters and how to avoid the hazard.

Table 2. The Concept Strategy

INTERNAL / EXTERNAL	STRENGTH	WEAKNESS
OPPORTUNITY	• Undertake the community empowerment both in the social and economic. • Making Cangkringan region into an area of research studies. • Government records and coordinate all the community organizations in the region to be trained of the integrated disaster mitigation together. • Local governments accomodate the volunteers who came and distribute evenly in each of the affected areas. • Empowerment efforts and providing knowledge on disaster management to every the village/hamlet leader in Cangkringan.	• Providing good facilities and infrastructure to the community. • Helding disaster mitigation efforts on a large scale. • Educating the local community about the importance of early evacuation during a disaster. • Creating a comfortable shelter and grouped by local community groups that existed before. • Government approaches the local community by organizing sharing sessions or discussions together to build the community trust to the government. • Providing training in specific skills that can be used to increase the economic income of the community. • Providing psychologists to recover the traumatic effects.
THREATS	• Strengthening coordination between central and local governments in the disaster management process. • Government made a complete and accurate data collection on land and buildings ownership. • Engaging academics and practitioners in establishing and building shelters for refugees. • Repair and renewal the disaster mitigation infrastusture periodically.	• Improving coordination between civil society organizations and the government so that there is synergism planning policies through a bottom up-top down. • Encourage the community to actively increasing the welfare by providing the media such as self-development and course. • Invite the public and the private sector to create the social enterprise to empower the Cangkringan community.

Since Merapi eruption in 2010, Merapi refugees have been granted in the form of skills training to make crafts and food innovation. The training was organized by many people not only governments and other parties also take a part such as researchers, academics, students up to the private sector involved in this activity. One of the skills provided is bakpia manufacturing innovation. Bakpia is a traditional food of Yogyakarta that usually made from 'green beans', but now the community is actively developing bakpia are made from purple sweet potato. Purple sweet potato is a commodity that easy to find in Cangkringan,

in addition it is easy in the process of cultivation and the price is quite cheap. This product attract people so that sales turnover of bakpia purple sweet potato is also good. This also affect the economic improvement of the surrounding community. This products are marketed in many tourism places in Yogyakarta and it is often participated in various food exhibition. The government also often sought special exhibition for the products of the slopes of Merapi communities as a means of products publicity. Beside bakpia, there are many other types of business activities such as batik, cakes, clothing and accessories.

3. SWOT Analysis

Based on the data by interviewed 50 people sampled in Cangkringan, it can be found a lot of interesting facts which can be classified in each of the SWOT components. SWOT itself actually includes two factors: internal factors (strength and weakness) and external factors (opportunities and threats). Internal factors is a factor which influence wholly derived from the study object, in this case Cangkringan local communities themselves can bring a positive influence (strength) and can also bring a negative influences (weakness), while external factors are factors that originate outside the local community Cangkringan but from nature, the environment and the influence of other outsiders. Based on the observation and the data from Cangkringan coomunity, the SWOT factors can be mapped one by one. The SWOT analysis of Cangkringan community can be found on the table 1.

The SWOT analysis is useful to decide the next step of making the concept strategy accurately. After doing the SWOT analysis, every factor in SWOT can be divided into four categories by using the cross tabulate table to identify it. These are: strength and opportunity, strength and threat, weakness and opportunity, and weakness and threat. each category will produce different plans based on a combination of conditions and problems. The combination of the positive and negative aspects should be combined so that there are positive aspects to overcome the negative aspects that exist in synergy. The concept strategy can be seen to the Table 2.

4. Conclusion

The main problem in organizing the community-based disaster management is an effective coordination and communication between local government and local communities. The government must be able to provide good socialization and a good persuasive understanding in explaining the danger of Merapi eruption faced by the community then the programs implemented by the government are going to be effective, such as simulation of disaster mitigation process conducted in their spare time so that people do not have to leave their jobs and can follow the simulation of disaster mitigation. Additionally, evacuation and shelter facilities also need to be considered in order help the society in providing their need and have a healthy life even in disaster conditions. Optimization of existing facilities and infrastructure should also be made so that the rescue planning can be well-implemented. For the development of the post-disaster, the provision of capital and skills training need to be improved further so that people are not only act as producer only, but can also act as a distributor so that people can be more self-reliant in the development effort of their own business.

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