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Vulnerability on Disaster Prone Area III at Mount Merapi

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Abstract. Mount Merapi located on Java island, is once of active mountain in Indonesia. Mount Merapi have been eruption periodic than other mountains in Indonesia. In 2010, Merapi eruption is the biggest after eruption 1961. More than 200 die in Mount Merapi eruption 2010. As tourism destination long time ago, post eruption Mount Merapi 2010 became new tourism destination. The visitor to tourist destination in Disaster Prone Area III Mount Merapi high increase than before erupstion 2010. *Lava Tour* is the name tourist post eruption Mount Merapi 2010. Operator *Lava Tour* are majority the victims of eruption Mount Merapi which still living in Disaster Prone Area III. According to rule, Disaster Prone Area III forbidden to build the house and living activity. But, they still living in Disaster Prone Area III because tourism business. Therefore, the community in Disaster Prone Area III is a vulnerable to disaster. For to building the capacity, then need disaster literacy approach.

keyword : disaster, capacity development, vulnerability, Disaster Prone Area III, , disaster literacy.

INTRODUCE

Lava tour is a tours in post of disasters eruption of Mount Merapi 2010. *Lava Tour* have a few attraction, like Mbah Marijan house, Alien stone, Bungker Kali Adem, "Sisa Hartaku" museum, and off road in Kali Kuning river.

Lava tour is managed independently by the community. Especially the community was the victim of Mount Merapi eruption 2010. Subagyo said, (head of sub-village Pangukrejo, in structural government under Umbulharjo Village, Cangkringan, Sleman, Yogyakarta), that the *Lava Tour* basically started in the post-eruption of Mount Merapi 2006. Bungker Kali Adem is the icon, which has two SAR personnel killed in Bungker at Kali Adem on eruption 2006. Then in post eruption of Mount Merapi 2010, *Lava Tour* tourist attraction continues to grow organically.

Mount Merapi is located in some parts of Yogyakarta Province and other part in Central Java Province. Mount Merapi is one of the most active volcanoes in Indonesia. Mount Merapi has 33 times erupted since 300 years ago. The largest eruption ever recorded is the year 1822, 1872, 1930-1931, 1961, 2010. Data are based on data by Kementerian Energi Sumber Daya Mineral Badan Geologi [1].

The biggest eruption for 20 years is the eruption of Mount Merapi 2010. Eruption 2010 is the most terrible and destructive eruption than past. The biggest eruption, because Mount Merapi was able to spew volcanic material up to 140 million m³ [2]. The quantity of Merapi material that had never been that much.

Before the eruption of 2010, people in around Merapi livelihood is farmers or ranchers. In post-2010, the majority of the victims have changed professions, like in the tourism business, or in the sand mining business. Others still livelihood farmers or ranchers. But mayority changed professions in tourism business or sand mining business.

In early 2011 to 2012, the *Lava Tour* operator is victims from the eruption Mont Merapi. The disaster tourism business is organically grown along with the many visitors who are curious about the effects of eruptions that killed more than 300 people and destroyed villages.

Up to a distance of 7 km from the top of Mount Merapi, where the impact of Merapi eruption appears, the community provide facilitates for the tourist with ojek (motorcycle taxi services). Due to the damaged condition, the motor trail became the main vehicle. In the condition, motor trail can through the prone zona. But eventually the vehicle turned into a larger vehicle and load many people. jeep became the solution (interview with Fajar Radite, jeep driver, and resident in sub-village Pangukrejo). Eventually, jeep and ojek trail become the icon of *Lava Tour* attraction.

Lava Tour continues to grow with high profit. In bussiness *Lava Tour* becomes a magnet around Mont Merapi, especially in the Kabupaten of Sleman. Dardiri, as Jeep Merapi community leader who joined in AJWLM (Asosiasi Jeep Wilayah Lereng Merapi) assosiation of community tour jeep in Mount Merapi region said, that AJWLM manages 29 jeep communities with a total jeep of more than 800 (interview, 1 Agustus 2017). The enthusiasm of the community manages the *Lava Tour*, because the business can have a lot money quickly than to working as farmers and ranchers. In Pangukrejo 80% of people choose work in the *Lava Tour* business rather than back to their jobs before. Just 20% of the population still a job before eruption. The majority of these 20% are elderly, or their resources are not able to support tourism activities, such as being a jeep driver (interview with Subagyo, May 11, 2017).

Behind the *Lava Tour* business is growing fast, this business also have a unique phenomenon about the communiy life. As the main source of community income in the area of Mount Merapi, the victims of eruption 2010 choosing to live in the prone zona because of economic resources. Rebuilding houses destroyed by eruption material, though the area is a part of Disaster Prone Area III (Kawasan Rawan Bencana III). They want to be close to their economic source, therefore people still choose to built in KRB III area. The government is basically providing permanent residences (Huntian Tetap - HUNTAP) in safer areas, but the community not all to live in HUNTAP.

According to tata-ruang regulation in Kabupaten Sleman, KRB III is not development focus by government. Infrastructure in KRB III is not a concern of government focus, such as water, electricity and road infrastructure. Until now, the infrastructure is still a problem, especially the quality of roads. Manny people complain about it, because the road in KRB III is low standard for disaster risk reduction. Community in KRB III was wanted have the wide roads and good quality to easier for people to evacuate if Mount Merapi erupts again.

Through interview and observation approaches, communities in Disaster Risk Areas III understand that they live in areas susceptible to natural disasters eruption. the community understands the risks if they stay in KRB III. But for 7 years in the area, the community didn't have a clear system in improving the community capacity in disaster risk reduction eruption of Mount Merapi. Although in some communities, the discussion began to be discourse.

In this paper, researchers are trying to describe how vulnerability in the community in Mount Merapi, especially in KRB III, and how the community responded of the vulnerability in the area, and built the solustion about their vulnerability.

ANALYSIS

Disaster Prone Area III (KRB III) in Mount Merapi is a red zone, where this zone is the most damaged area caused by eruption material. KRB III is a zone of disaster prone area III which is often affected by lava flows, throwing or pounding of rock (incandescent), and poisonous gas [3]. Basically this zone is forbidden inhabited, and for human activities. Zone rules only on active volcanoes.

Referring to the BPBD map, the disaster-prone zone map of Mount Merapi is not based on the ring (ring zone 1, ring 2, and so on), but refers to the direction of the eruption material. So if viewed in the historical map of eruption of Mount Merapi 2010 (figure 1), we will see the map like jellyfish. The red color is KRB zone III, the pink color for KRB II, and the yellow color for KRB I.

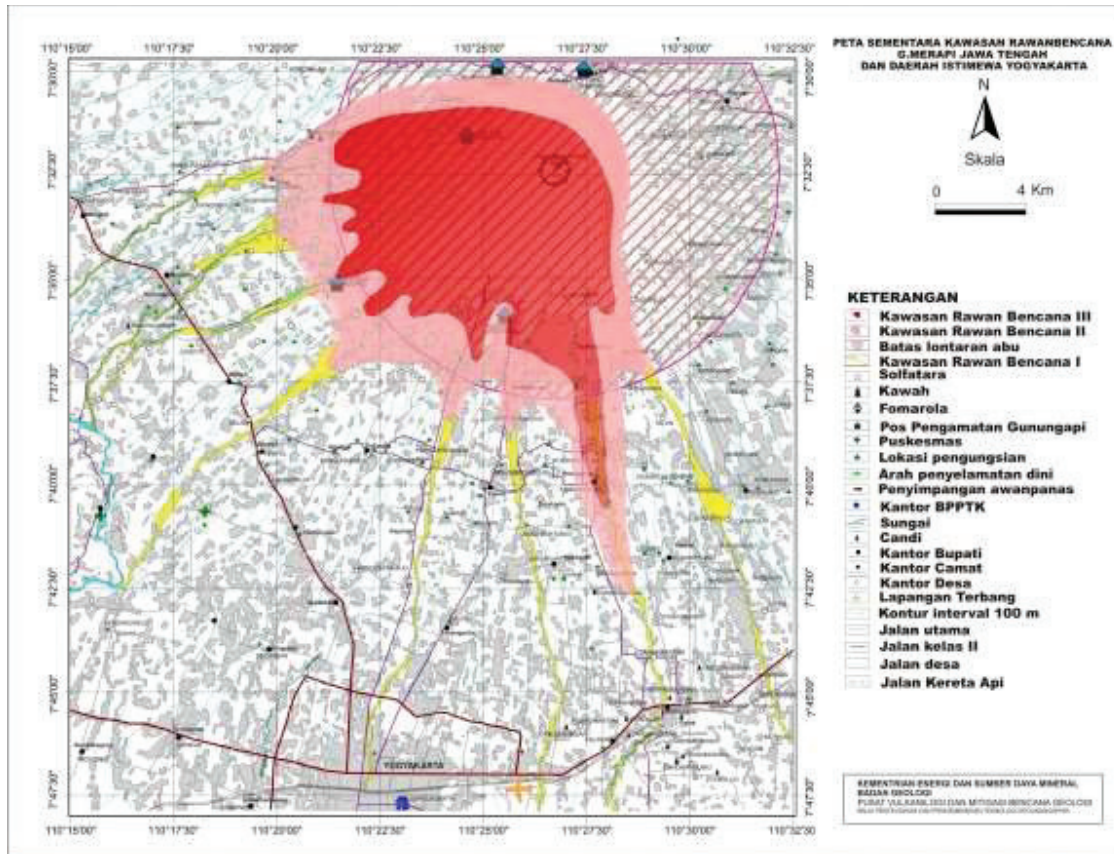


FIGURE 1. Zoning map of Mount Merapi Disaster Prone Area (KRB) refers to eruption 2010. Source of BPBD Sleman 2017

Material from the eruption of Mount Merapi 2010 through the river Opak and Gendol. Uniquely Merapi, eruption of Mount Merapi always changed in every eruption. In 1994, pyroclastic (also call *wedus gembel* in Javanese language) material through the village of Turgo, located in the southwest of Mount Merapi. In the next eruption, in 2001 pyroclastic through Bebeng or Kali Adem. In 2006, pyroclastic destroyed Kali Adem that killed 2 SAR personnel.

Seen from eruption history that ever happened, the head of sub-village of Pangukrejo said the vigilance of the dangers of Mount Merapi still exist. because the pyroclastic blew of Merapi eruption is always different every time (statment is taken Pangukrejo community self-evacuation simulation meeting, 16 October 2017). Therefore, people in KRB III, especially in Pangukrejo try to take initiative to build independent mitigation. Because the community in KRB III is not supported by the government, especially in building disaster risk reduction infrastructure.

Tourism as part of Community Resilience in KRB III

The phenomenon of disaster becomes a tourist attraction is a common thing. Hurricane Katrina August 29, 2005 in New Orleans, USA became an interesting topic in connecting disaster and tourism. In a published article on Miller's research, that post-hurricane Katrina that killed more than 1000 people, many people around New Orleans to seen the ferocity of the storm. Manny people come in there, until New Orleans people made tour guide for tourist. tour guidenya is a storm victim. Hurricane Katrina quickly became a tourist attraction, because New Orleans is basically a tourism town.

Like New Orleans, *Lava Tour* as a tourist attraction after the disaster may be growing fast because of its influence as one of Yogyakarta's popular tourist destinations in Indonesia. So people still come to the tourist area, although the object of tourism is not the same than past. (the condition of Kali Kuning, Bebeng, Kopeng and Kali Adem are different after 2010 and before 2010).

Disaster tourism is basically a vehicle to understand how disaster impacts appear through tourism [4]. According to Potts that basically the purpose of disaster tourism is only interested in destruction, rather than intend to help [4]. The question arises then, why disaster can be a tourist attraction? according to Miller there is a high emotional impact if someone visits the disaster site. Travelers became interested in visiting the site because of the "high emotional impact" associated with death and disasters [4]. for example on Katrina disaster tours, disaster objects provide a glimpse of something unique to see the harsh reality of everyday life it sees [4].

Lava Tour is the way people to survive in KRB III. In sub-village Pangukrejo, the pre-2010 and post-2010 periods are clearly different. In post-2010 infrastructure such as clean water, electricity, and roads are not like before. Electricity is taken from the monitoring infrastructure of Mount Merapi, people built waterways from house to house. But for the road, people can't fix themselves. Because the road is used by tourists, and less standard in the context of disaster risk reduction infrastructure. As well as very expensive to build the road.

People in KRB III are faced with vulnerability in periodic disasters. In this case, the vulnerability in KRB III is a political and geographical vulnerability. Geographical vulnerability refers to the location or region in which they live. Some villagers such as Umbulharjo, Glagahharjo, Pangukrejo, or Kinahrejo choose to live in disaster prone areas. Vulnerability in political factor is referring to Law No. 1 of 2011 about *Perumahan dan Kawasan Pemukiman* (Housing and Settlement Area), that the public forbidden to stay in the area of potential and cause danger. The area of KRB III is considered to be a danger area. The rules are not allowed to be build permanent building.

Resilience in disaster is a community with capacity to survive in disaster prone areas with its preparedness. Resilience the meaning of spring, Tiwari mentions it "bounce back" from the Latin root "resiliere" which means "to jump back". Holing (1973,1986) The defined the term resilience for an ecosystem as the measure of the ability of an ecosystems to absorb change and still persist [5].

Walker *et.al* explains that resilience is the capacity of the system to absorb disturbance and reorganize, while performing changes, and fundamentally withhold function, structure, identity and reversion to get back to normal [6]. People known choose to stay in the disaster-prone zone III (KRB III) is a risk. To develop of resilience, people try to absorb the vulnerability, ready to life in environment changes by trying to adjust to build life as it was.

Lava Tour is a part of the reconstruction and rehabilitation by the community after the eruption of Mount Merapi 2010. This is the way of community in KRB III to survive in the zona where they have long lived. Tourism is not just a business, but it has become part of the way the community survives, as well as the way they build their capacity in disaster reduction.

The evacuation simulation by sub-village Pangukrejo community on November 5, 2017 is part of the community in KRB III, especially in sub-village of Pangukrejo in building their capacity to face the disaster. Evacuation simulations emerged from community initiatives that disaster capacity must be increase.

In the evacuation simulation which called the *Simulasi Evakuasi Mandiri* program community in sub-village Pangukrejo supervised by BPPTKG (*Badan Penyelidikan dan Pengembangan Teknologi Kebencanaan Geologi*), as part of scientific information source which can be permanent reference. In the simulation evacuation, not focus for a big eruption of Mount Merapi, but simulation of phreatic eruption. "*A phreatic eruption that is unpredictable*", according to Nurcholik as supervise from BPPTLG in a discussion with the Pangukrejo community. The eruption is gas, which is not preceded by a strange tremor in the seismograph or deformation. From the experience in 2013 and 2014 there has been a phreatic eruption in Mount Merapi, a sudden eruption that caused panic in the resident around of Mount Merapi.

From a phreatic experience in 2013 and 2014 Mount Merapi, and phreatic eruption July 2, 2017 at the Crater Sileri Gunung Dieng, the Pangukrejo community initiative to create an evacuation simulation program. The community understands the risk that they stay in KRB III, which in the rule that KRB III haven't got development program from government, therefore they must be independent. Increase the tourism business and capacity building are part of the community increase resilience capacity in disaster prone areas.



(a)



(b)

FIGURE 2. a) Community discussion in planned evacuation simulation program in sub-village Pangukrejo. b) Nurcholis from BPPTKG when explaining what a phreatic eruption is. October 23, 2017

The community uses everything that can be supportive in the simulation of the evacuation. Jeeps *Lava Tour* could be a support for disaster risk reduction. Therefore, in *Simulasi Evakuasi Mandiri* on November 5, 2017, the community invited the jeep communities in the sub-village of Pangukrejo. The jeep community in join the simulation are TLCM, JWM, MLCC, Merapi Jaya, and Belantara. Fajar as one of the resident sub-village Pangukrejo said, in the condition of the road is damaged, Jeep assets strongly support the evacuation of the community quickly.



(a)



(b)



(c)

FIGURE 3. a) Preparation of Self Evacuation Simulation of sub-village Pangukrejo, meet at Gunung Merapi School. b) Utilizing tourist assets, a jeep tour for community evacuation. c) part of sub-village Pangukrejo evacuated to Plosokerep Barracks, at KRB II. November 5, 2017

Communities are aware that building capacity will reduce their vulnerability. This simulation evacuation is also directly a message that they should be noticed by the government. Inadequate infrastructure condition, to the condition of tourism is prone in case of disaster.

Head of sub-village Pangukrejo said, this simulation will continue. Started with an evaluation of the November 5, 2017 simulation program, the community will know the weaknesses, and will be corrected and evaluated for the next.

In this case the community in KRB III in Mount Merapi, especially in sub-village Pangukrejo, already understand the vulnerability in the region, especially geographical vulnerability. Choose to live in KRB III, that must be to increasing capacity. This is the most moderate solution in building community resilience in KRB III.

CONCLUSION

Lava Tour is the way the community rise up from their downturn after the eruption of 2010. Tourism is the way the community in KRB III conducting independent reconstruction and rehabilitation.

Although they got housing in Permanent Residences (HUNIAN TETAP) but due to tourism business, they chose to stay in KRB III. They build resilience in the conditions is change after eruption 2010.

The community understands about vulnerability, and tries to build its capacity. Through the evacuation simulation on November 5, 2017 in the sub-vilage of Pangukrejo, the community has started to map it, the learning about character of Mount Merapi, and began to increase its capacity in the face of periodic and permanent Merapi volcano disaster.

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