

Sekolah Paseduluran as a Social Capital to Increasing Community Preparedness to the Eruption of Merapi Volcano

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Abstract—Merapi volcano is one of the active volcanoes in the world that located on the border of two provinces of Yogyakarta and Central Java. After the eruption of Merapi Volcano in 2010, lava dome of Merapi Volcano change towards the south area of the volcano. Glagaharjo village is the closest area in the south area from the dome of the crater of Merapi. Due to this condition, Glagaharjo village has the highest vulnerability. This study aimed to identify strategies to improve preparedness as social capital to face the volcanic eruption of Merapi. The method that use is literature study, field observation, and deep interview related to social capital for preparedness to face the disaster of Merapi volcano. The kind of social capital in Glagah Harjo village demonstrated through the cooperation of the community and schools on the southern area of Merapi Volcano formed as *sekolah paseduluran*. *Sekolah paseduluran* is one of the disaster

risk reduction efforts based on educational system at the school start from elementary until high school.

Keywords—*Componen, community preparedness, Merapi volcano, sekolah paseduluran*

I. INTRODUCTION

Merapi volcano is one of the active volcanoes in the world that located on the border of two provinces of Yogyakarta and Central Java. The last eruption happen in last 2010. Since the 20th century until 21, Merapi Volcano eruption that occurred in 2010 is the largest-scale eruption VEI (Volcanic explosivity index) 4 (Surono et al, 2012). Previous eruptions of Merapi

Volcano with 4 VEI scale last took place in 1872 (Surono et al, 2012).

Surono et al (2012) mentions that the eruption happened in 2010 is divided into 4 phases of the incident. The first phase is the phase of intrusion characterized by increased seismic activity, increased temperature, and increased emissions. The next phase is the initial eruption characterized by the formation and release of gasses the eruption column sulfate, and then the third phase is a magmatic phase that is characterized by the formation of lava domes. Decline phase as the last phase is characterized by a decrease in seismic activity. At that time the eruption material issued to ± 130 million m³ with a medium-scale category (Kusumosubroto, 2013). Material from the eruption of Merapi Volcano is generated when it is in the form of PDC (Pyroclastic Density Currents) or either hot clouds of pyroclastic flows or pyroclastic gusts, raining ash and lava.

The eruption of Merapi volcano in 2010 spent around 10 million cubic meters of volcanic material, around 67 people were killed, 400,000 people were evacuated and 2,300 houses destroyed. Volcanic material also destroyed infrastructure such as sabo dams, bridges, and roads. Total damage and losses Merapi volcano eruption is estimated around Rp. 3.5 trillion (BNPB, 2011).

Glagaharjo village is one of another village that located in the third disaster-prone areas. Glagaharjo located in Cangkringan Sub-district, Sleman Regency, Yogyakarta. Glagaharjo is a area whom directly affected by the eruption of Merapi volcano in last 2010. The prone area of Glagaharjo shown in Figure 1. After the eruption of Merapi volcano in 2010 lava dome of Merapi volcano changed to the south area and Glagaharjo village is the closest area in the south area from the dome of the crater of Merapi volcano.

Disaster management deals with all aspects of planning for responding to disasters, including catastrophic events before and after the disaster may also refer to the risk management and the disastrous consequences (Shaluf, 2008). The disaster management to faces the disaster such as the eruption of Merapi volcano is not only the responsibility of the government, but also it becomes the collective responsibility of all elements of society.

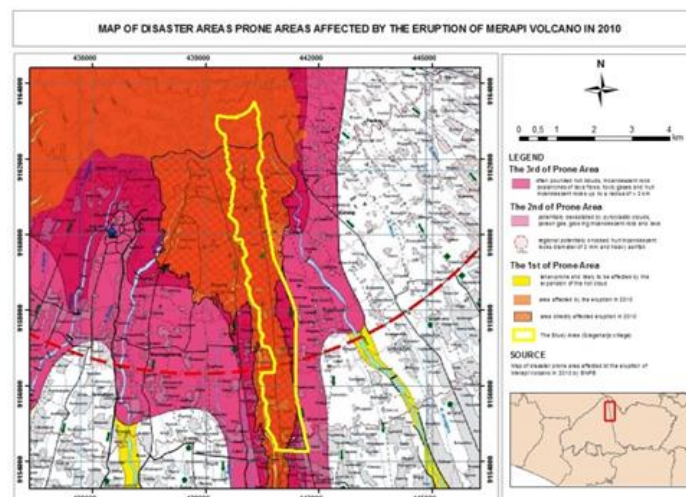


Fig. 1. The prone area of Glagaharjo village

The role and participation of the community can be an effort to increase the capacity of community preparedness. Preparedness is an effort undertaken to anticipate the possibility of a disaster in order to avoid loss of life, loss of property, and changes in people's lives in the future. Disaster preparedness is a condition of the people who either individually or in groups that have the ability to anticipate the possibility of disaster in the future (Gregg et al., 2004; Perry and Lindell, 2008; Sutton and Tierney, 2006). Preparedness from the society will make the society better prepared when disaster strikes. This community preparedness will minimize negative impacts arising from a disaster. Preparedness to face the disaster can be viewed from the aspect of social capital.

Social capital often defined as the ability of individuals or groups to cooperate with other individuals or groups. Communities or individuals who have better social bonds with each other will be easier in the existing preparedness. Besides social capital both among the public in disaster-prone areas will reduce the vulnerability itself (Martens, 2009). Social capital among the population will facilitate the public in mobilizing at the time of evacuation will be carried out. Social capital can also be an indicator of preparedness others as agreed evacuation same place, agree on training, and together in other preparedness actions (Sutton, 2006).

This study aimed to identifying the strategies to improve preparedness as social capital to face the volcanic eruption of Merapi volcano. Our study focus to identify the kind of Social Modal as a form of disaster preparedness. One kind of Social Modal is *Sekolah Paseduluran* or known as Sister School.

II. METHOD

The method that use in this study preceded by literature study related to social capital as a form of preparedness in the disaster management. Field observation and depth interview also used to saw the variations in the distribution of community characteristics as the element of risk in Glagaharjo village. By field observation we also conducted to determined the kind of Social Modal development specially *Sekolah*

Paseduluran in Glagaharjo village. The field observation and depth interview held to get the information related to *Sekolah Paseduluran*. This study focused on the school in Glagaharjo which known as *Sekolah Paseduluran*.

III. FINDING AND DISCUSSION

Preparedness in a disaster management should be part of the culture and local wisdom in a society. Preparedness in disaster management should be introduced in the beginning of the education system at the school. The students have to be understood about the prevention, preparedness, and mitigation of the disaster management. Preparedness of the disaster management in the school environment is quite important especially on the schools which located in disaster prone areas. The education about preparedness of the disaster management is necessary in a society as a social capital to disaster risk reduction effort.

Sekolah paseduluran or known as Sister School is one of preparedness and mitigation effort of government and communities cooperation to improve preparedness in at the level of both elementary school until high school especially for the school located in prone areas. *Sekolah paseduluran* is one aspect of the cooperation in paseduluran village concept. This concept is a deal the two areas to make efforts to disaster management activities together based on the spirit of solidarity. The implementation of *Sekolah paseduluran* is the desire to provide a learning atmosphere that is comfortable and appropriate for school educates students who have been affected. It makes the learning process can continue to run effectively, namely to carry out teaching and learning activities in schools that do not affect the location of the disaster that is located not so far from the barracks. There is a few points of agreement between the parties to cooperate, namely agreement on the organization of learning activities, clearing the use of educational facilities, as well as the evacuation of students deal.

Through the application of the concept of *Sekolah paseduluran* in Sleman can reduce the risk of disasters which arise particularly in the fields of education, so that students can still get their right to education is good and decent in spite of being in a state of disaster. In addition to the efforts made through the implementation of disaster mitigation is also necessary to good cooperation between all the parties including government, private and community in an effort to succeed to risk reduction efforts. Due to the cooperation of all parties including government, private and public course is a formulation that is indispensable in order to minimize the risk of disaster in Sleman. In the concept of *Sekolah paseduluran*, there are a few points of agreement between the parties working together.

Sekolah paseduluran developed in 2015 which distributed in 20 schools in Sleman Regency. The schools are schools that directly affected by the Merapi eruption and school functioning as supported school. When the status of Merapi volcano increase, the students and teachers in schools affected are able

to evacuate to the supported schools. The 20 *Sekolah paseduluran* in Sleman Regency shown in Table 1.

TABLE 1. THE *SEKOLAH PASEDULURAN* IN SLEMAN REGENCY

The affected school	The supported school
SMK Muhammadiyah Pakem	SMK Muhammadiyah 1 Sleman
SMAN 1 Cangkringan	SMAN 1 Pakem
SDN Banyu Urip 1 Turi	SDN Turi 3
SD Muhammadiyah Cepitsari	SDN Kejambon 2 Ngemplak
SDN Klopasawit Tuti	SMP 1 Turi
SMP Taman Dewasa	SMK 1 Cangkringan
SDN SDN Cancangan	Kiyaran 2 Cangkringan
The affected school	The supported school
SD Muhammadiyah Balerante	SDN Klegung 2 Tempel
SDN Glagaharjo Cangkringan	SDN Bronggang Cangkringan
SDN Gungang Cangkringan	SDN Umbulwidodo Ngemplak

In Glagaharjo village, there are 2 of *Sekolah paseduluran* held at elementary school level. They were SD Muhammadiyah Cepitsari and SD Negeri Glagaharjo as shown in Figure 2. Both elementary are located on the south side of Merapi Volcano. SD Muhammadiyah Cepitsari located 12.2 km from the crater of Merapi volcano. This school goes into disaster-prone areas with a quite large potential risk. Similar with SD Muhammadiyah Cepitsari, SD Negeri Glagaharjo also entered into disaster-prone areas. Therefore, the determination of these two schools as *Sekolah paseduluran* considered important. The concept of *Sekolah paseduluran*, the elementary school is expected to have a high capacity so the potential risk each student, the school community and the surrounding areas can be minimized.



Fig. 2. SD Negeri Glagaharjo



Fig. 3. Sekolah Paseduluran

Under normal circumstances, the students who are in school disaster preparedness (usually located in the disaster area) has been periodically or independently learn to dress to save themselves (evacuation) together with the teacher on a scheduled basis. *Sekolah paseduluran* concept has become one of the containers of various efforts made by the government. As schools affected, their sister school will also facilitate the process of evacuation. Various government programs particularly related to socialization and disaster simulation so that each individual know what the impact of Merapi eruption and what actions they can do. It is also recalled that early childhood is the productive age so it has a greater degree of vulnerability. The level of vulnerability of the shows the inability of a person in the face of disaster is large enough so that one way to reduce risk is through increasing the capacity of each individual.

To prepare and increased preparedness of the students and teachers, the government held a simulation, although the condition of Merapi volcanic is safe. Simulation activities carried out in order to anticipate the event of disaster, especially Merapi eruption, so that people and especially students and the schools are better prepared when disaster strikes.

Some barrier of the *Sekolah paseduluran* concept could be caused by the lack of human resources trained. For example, a school shelter in the building infrastructure is ready a but students and local teachers have not been trained and trained in refugee and training service model EM (self-evacuation). In the other hand also such as classical problems frequently encountered include a breakdown lane evacuation, alarm markers (EWS) does not work, signpost evacuation path lost/damaged may become the barrier of the main concept of *Sekolah paseduluran*. The integration of all element of the society is needed to face the barrier of this concept

IV. CONCLUSIONS

A social modal in Glagahharjo that became a strategies to improve preparedness face the volcanic eruption of Merapi formed as *Sekolah paseduluran*. There are 2 Sekolah

paseduluran which are SD Negeri Glagah Harjo and SD Muhammadiyah Cepitsari.

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REFERENCES

- [1] BNPB, "Gema BNPB: Ketangguhan Bangsa dalam Menghadapi Bencana (in bahasa)," vol.2 no.1, March 2011.
- [2] Gregg, C. E., Houghton, B. F., Johnston, D. M., Paton, D., and Swanson, D. A., "The Perception of Volcanic Risk in Kona Communities from Mauna Loa and Hualalai Volcanoes, Hawaiki," *Journal of Volcanology and Geothermal Research*, vol. 130, pp. 179-196, 2004
- [3] Kusumosubroto, H. Ir. Dip., HE, "Aliran Debris dan Lahar: Pembentukan, Pengaliran, Pengendapan, dan Pengendaliannya.(in Bahasa)," Graha Ilmu: Yogyakarta, 2013
- [4] Lindell, M.K. & Perry, R.W., "Behavioral Foundations of Community Emergency Management. Washington China. Habitat International," Hemisphere Publishing Corp: Washington DC, 1992
- [5] Martens, T., Garrelts, Grunnenberg, H., and Lange, H, "Taking The Heterogeneity Of Citizens Into Account: Flood Risk Communication In Coastal Cities – A Case Study Of Bremen," *Natural Hazards and Earth System Sciences*
- [6] Shaluf, I.M, "Technological Disaster Stages and Management," *Journal of Disaster Prevention and Management*, vol 17, pp 114-126, 2008
- [7] Surono, Jousset, P., Pallister, J., Boichu, M., Buongiorno, M.F., Budisantoso, A., Costa, F., Andreastuti, S., Prata, F., Schneider, D., Clarisse, L., Humaida, H., Sumarti, S., Bignami, C., Griswold, J., Carn, S., Oppenheimer, C., Lavigne, F., "The 2010 explosive eruption of Java's Merapi volcano — a '100-year' event," *Journal of Volcanology and Geothermal Research* pp. 241–242, 2012
- [8] Sutton, J., and Tierney, K, "Disaster Preparedness: Concepts, Guidance and Research," Colorado: University of Colorado, 2006