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ACTION OF LOCAL PEOPLE TO THE ENVIRONMENT OF MERAPI SLOPE YOGYAKARTA

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Abstract **- Flash floods is one of the impacts of climate change that require serious attention because they humans. To anticipate dangerous floods, some actions should be done by all stakeholders to anticipate dangerous floods, including local citizens, because they know their environment in detail; therefore they can do the right actions to anticipate the flood. This qualitative research deiscribes the actions done by local citizens in anticipating flash floods due to climate change (extrem rainfall). The results show that the people of Umbulharjo village were aware that their environment is prone to flood due to the fact that *Kali Kuning* (name of the river) was full Merapi of eruption material as the sand and rock. Umbulharjo residents took action by managing the river to anticipate the flood. Their action was not solely for economic activity, but also to save the environment from the dangers of flooding.**

Keywords - Action, floods, local people, Merapi.

I. INTRODUCTION

Measures of local residents to manage the environment and protect themselves from the threat of natural disasters are an important thing to do (Fiscer, 2006). Those ideas originally come from grassroot who disasters handlers refer to them.

In some cases, organized or unorganized local resident actions have been done succesfully to eliminate disasters risk, such as the Chipko movement in India in saving the forest (Jain,1984). While Malik (2012) studied local residents actions in the slope of Lamongan Mountain in East Java which prevented floods and droughts. Farida (2013) also studied the actions to secur food effort done by local residents. Angraini and Suyuto (2013) saw an awareness of local citizens to keep cleaning the beach at South Coastal Bantul.

Those cases can be used as the evidence that the actions of local residents to preserve the environment plays an important role in reducing the risk of natural disasters. This study will also look back at the action of local residents in an effort to reduce the risk of disaster when the rainy season comes flooding caused by climate change which are difficult to predict. Especially after Merapi eruption in 2010, that resulted in 140.000.000 M^3 sand material scattered around of the Mount Merapi[2]. Allmost of the sand material is not flowed down, so it is potentially causing the flood during the rainy season. Moreover, *Kali Kuning* would not able to serve to channel the cold lava due to the river and SABO dam are already covered by the sand material.

Accordingly, the people of Umbulharjo realized that these conditions would jeopardize their villages due to flooding potential. Moreover, climate change is expected to cause excessive rainfall. Therefore, some efforts to prevent their village residents affected by flooding are to manage the sand with attention to environmental aspects. The one of its effort is not excessive sand mining using heavy equipment. They mine the sand with simultaneously normalize the flow of *Kali Kuning* and the door of SABO dam. Such actions constitute their efforts to manage the environment in order to avoid flooding when the rainy season comes. In summary, this study aims to determine the action of sand miners in *Kali Kuning* to prevent flooding.

[2] BNPB,2010.

II. METHODS

The research location is in Umbulharjo Village, Cangkringan Subdistrict, Sleman District, Yogyakarta Special Province. Umbulharjo Village lies in the east side of *Kali Kuning* upstream where most of the residents mine the sand and rock in down the river.

This study was done by qualitative research approach. Data was collected by interviewing some respondents chosen by purposeful sampling method that they knew more information respondents related to the topic of the research (Patton, 1990). Therefore, chosen respondents should know information needed for the research. The respondent ware divided into three categories. The first was the formal leaders who had close relation with communities such as chairman and vice chairman of the village. The second was the informal leaders such as religious leader and youth leader. The third was some miners who mined sand and rock down the *Kali Kuning*. The indepth interview done to the respondent for about three weeks (Groenewald, 2004).

An observation on the research object was also done to complete the data. Observed object included: action of mitigation effort, *Kali Kuning* condition after Merapi erupted in 2010, setlements conditon which lied on the side of the river.

Secondary data was collected to add some research information needed. Secondary data is included any related information which was documented in offices of sub-village, village, and sub-district. Others data are included recently related research and any information from news papers and magazines.

Qualitative data analysis wasdone by following interaction model which is developed by Miles and Huberman (1984). There are some sequence work in Miles and Huberman's model which those are collecting data, reducing data, overlaying of analyzed data and conclusion.

III. RESULTS AND DISCUSSION

1. Overview Umbulharjo Village and Kali Kuning

Umbulharjo Village is one of the all village which is under the Goverment of Cangkringan Subdistrict and Sleman District (Figure.1). Based on the geographic map, Umbulharjo is bordered by *Kali Kuning* in the west side, Wukirsari Village in the South side, Kepuharjo Village at the east side and by Merapi National Park in the north side. The climate in Umbulharjo Village and the surrounding is wet tropical type with the rainy season happening from November until April and the dry season happening from May until October. The average of the rainfall in Umbulharjo is more than 60 mm with 20 rainy days.

Based on data 2013, the population of Umbulharjo Village was 4,678 persons consisting of 2,369 males and 2,309 females in 1,473 families. Their ethnic is Javanese and they live near (around 200 m) the upstream *Kali Kuning* on the south slope of Merapi. Most of their livelihood were livestock and mining sand and rock on down the river.

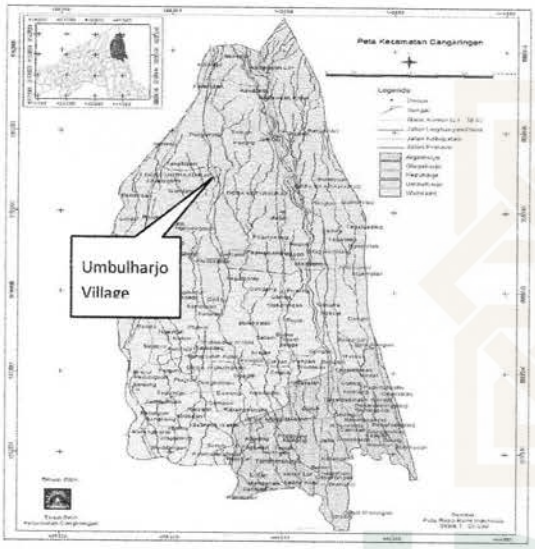

Figure 1. Map of Umbulharjo and Other Villages in Cangkringan Subdistrict
Source: BPBD Sleman 2011

Umbulharjo people use the *Kali Kuning* for some daily utilities, especially to meet the needs of water by running it from the spring through the pipe into the residential area. Meanwhile in *Kali Kuning* downstream, the water is used for irrigation of paddy fields and fisheries. For now they have not specific ways to keep *Kali Kuning* because the river has never experienced a drought or flood. the river on the slopes of Merapi including *Kali Kuning* must be done so that cold lava will not overflow into residential areas.

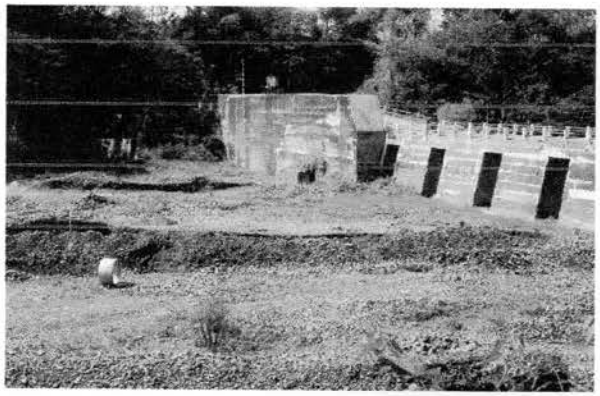

Figure 2. SABO Dam Condition After Eruption 2010 and Dredging
Source : Research data 2013

However, after the eruption of Mount Merapi in 2010, cold lava in the form of sand and stone in abundance spread to several There are three dams with the height of 50 M in the *Kali Kuning*. The dam were made to inhibit the rate of cold lava. However, the three dams and farmland on the river bank were covered by cold lava after the eruption of 2010. Therefore, the government with volunteers did the dredging of the cold lava for dam door opening as high as 15 M and the normal river flowed. Then the local residents continue dredging cold lava while mining the sand and stone, so that agricultural land on the banks of the river can be replanted (Figure 2.)
Although hot lava flowed in the *Kali Kuning* upstream from the eruption in 2010, because the river was steep and deep, the lava flows are not harmful for the citizens of Umbulharjo. rivers such as the *Kali Kuning*, *Opak*, and *Gendol* and also residential land (Table 1.). Therefore, normalizing the flow of the river on the slopes of Merapi including *Kali Kuning* must be done so that cold lava will not overflow into residential areas.

Table 1. Material Quantity of Several Merapi Eruption

Year	Sand and Rock (eruption material)
1961	42.400.000 m^3
1967, 1969	1.400.000 m^3
1984	4.500.000 m^3
1994	3.000.000 m^3
1997	1.400.000m^3
2001	1.400.000 m^3
2006	1.400.000 m^3
2010	140.000.000 m^3

Residents of Umbulharjo mine and load the sand and stone into the truck using the conventional tools. Sand and stone mining activities have a positive effect to the flow of water from mountain springs following the current of the river so that when the rainy season comes, the cold lava flow will also follow the current of the river. In addition, the positive effects of such mining is that farmland on the river bank is running again (Figure 3).

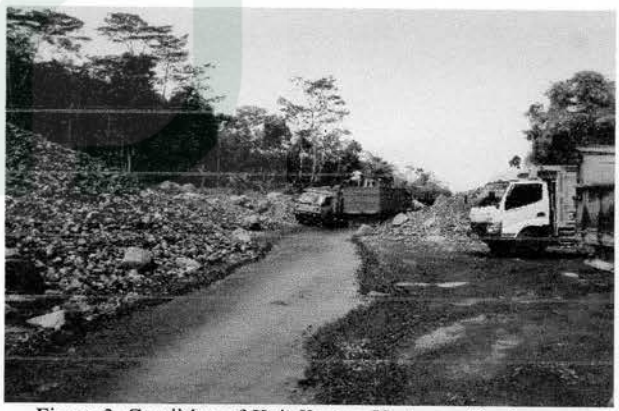

Figure 3. Condition of *Kali Kuning Upstream During Mining Sand and Rock*
Source : Research data 2013

2. Drainage Result of Sand Miners Actions in the *Kali Kuning*

Sand mining activity is one of the livelihood of the citizens Umbulharjo. A total of 20 families lives depend on the material of sand and rock of Merapi. Sand and stone mining work has been done from the past generation to the next. This work was used as the mainstay of the sector due to the availability of sand and stone in the environment of Merapi. They mine the sand around *Opak* and *Gendol* River. However, after the eruption of 2010, it seems they have an arena which is closer to the settlements on the *Kali Kuning*. In the river, they

do not just mine alone, but meet with other miners who came from outside the village of Umbulharjo.
By using a traditional tools called *sangrog*, *cormorant* and cengkek they do not flock to mine, but they do independently. in the *Kali Kuning* (Figure 4). They do not flock to mine, but they do independently. The determination of the location itself is also decided by miners, but they are more likely to follow the stream of water flowing in the river. They mine in places where there is water, with the hope that the water helps them to separate the sand and rocks because small stones will not sell. Their work is easier if there is water running compared to mining in a place has no water.

Figure 4. Traditional Mine Tools
Source : Research data, 2013

Sand and stone are colected close to the mining area. They earn less than a 2.5 M3, and sand stones are sold at the price of IDR.45.000, -. They are having trouble to mine stone, because not all stones are marketable. Marketable stone size is not too small nor too big. If they get the stones are not sold, then the stones that can not be sold, then the stone placed at the edge of a sandquarry to shore up the cliff and to prevent landslides.

The distance of one miner to the others is about 50 meters. Mining arena is actually free, the miners can mine anywhere in *Kali Kuning* bank. Water availability is a limiting factor in choosing the most strategic mining, because of the heavy water will get the better quality of the sand and not mixed with volcanic ash. Sand excavation depth can reach 4 meters (Figure 5a). The miners do not take a position parallel to other miners, but following the miners in front of them (Figure 5b.).

Figure 5a. Send and Rock Mining in *Kali Kuning*
Source : Research data, 2013

Actions or activities of sand miners are intended to prevent flooding by making the river flow and drainage. This action stems from an awareness that their neighborhoods would be in danger of flooding if the river flow and drainage are not fixed.

After 2010 there is also a concern to prevent the eruption of hot lava, from running through river channels as it dangerous for local residents, should Merapi erupt again. They realize that with traditional tools such as the above, the conditions of the Kali Kuning is maintained.

Figure 5b. Miners Position in the *Kali Kuning*

Although some residents of Umbulharjo gets revenue from mining sand and stone, it does not become their primary purpose. They have a further purpose, the availability of long-term sand by means of keeping the river from the flood threat that will undermine the depleted sand and stone and is very dangerous for them.

3. Actions of Environment Conservation

Climate change is a global issue that is very important since the convention of the Earth Summit in Rio de Janeiro 1992 the Convention on Climate Change or UNFCCC (United Nations Framework Convention on Climate Change) is one of the agenda in the document Agenda 21. This convention was ratified by Indonesia through Law No. 6 In 1994. The primary purpose and objective of the convention is to maintain a stable concentration of greenhouse gases in the atmosphere, to guarantee food security and sustainable development. Based on the data recorded in the event of a disaster OFDA / CRED International Disaster Database in 2007, the ten largest events that occurred in Indonesia during the period 1907 to 2007 were largely climate-related disasters (meteorological related disasters), such as floods, droughts, forest fires, and pest / disease. This suggests that the incidence of disasters related to climate aspects have increased in frequency and intensity.

The anticipation of flooding due to climate change requires the cooperation of many parties, not only at the international level but also at the national level. The national level of cooperation is required between the government and all citizens, including local residents. The importance of the participation of local residents in anticipation of climate change

is because they know about the environmental conditions and they can determine the appropriate action taken to anticipate the dangers posed by climate change (Fiscer, 2006). The opinion was reinforced by (Ahimsa, 2012) that the actions of local people in managing available resources in ways based on their knowledge and abilities, posed very small pose other potential hazards.

The findings of this study be aligned with research Malik (2013) related to the actions of local residents on the Slopes of Mount Lamongan but in this study they prevent flooding by planting trees to prevent drought and floods. However, the results of this study differ from research conducted by Angraini and Suyuto (2013) on the management of the New Beach Bantul to anticipate the impact of climate change causing floods and tsunamis. Residents perform movement beach clean by not throwing trash on the beach.

Umbulharjo citizen's participation in environmental management is not solely aimed at economic benefit, but also to aim at reducing the risk of flooding due to climate change. This is consistent with Weber's (1979) rationality that social action is action taken weeks to peak at the destination. Weber further stated that the action was aimed at socio economic rationality and value. In harmony with the opinion of the Weber, Umbulharjo citizen's action to manage sand as their natural resources sand in the *Kali Kuning* by using to the maximum is not an act merely for economic gain but also for the value contained in the rationality of action to save the environment from the dangers of flooding.

IV. CONCLUSION

Umbulharjo people have their own way into dealing with climate change that can potentially lead to flood. They perform local actions to eliminate risk of flooding. Actions in managing natural resources, are performed not only for profit, but also to save the environment from the dangers of flooding in residential areas.

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