



Post-Disaster Management in Indonesia: A Case Study of Relocation of Casualties of the 2010 Merapi Eruption in Yogyakarta and Its Impact on Their Socio-Economic Conditions

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Abstract

Mount Merapi erupted in 2010 causing many people living around its slopes to lose their homes, livestock and property. A total of 386 people died, several hamlets were badly destroyed, and 15,366 people became refugees amounting. The Merapi casualties were finally relocated to 18 permanent settlements (*hunian tetap/huntap*) spread over seven villages and two sub-districts in Sleman Regency. At the time of this research (2020), they have been living in the shelters - about 2 - 10 km from their place of origin - for approximately seven years. With reference to the permanent settlements of Banjarsari and Jetis Sumur this study examined the socio-economic impacts arising from the relocation, and the comfort level of residents living in the shelters. Primary data were obtained through field surveys and interviews. The results reveal that 1) The most obvious socio-economic impact is a change in the type of livelihood (sand mining and trading) and in the social behaviour (residents still feel afraid when there was heavy rain and strong winds and they always took time to worship in between their activities). 2) The residents were comfortable and felt at home in the permanent settlements of Banjarsari and Jetis Sumur. They no longer wish to return to their original villages. The implication of this research is that the 2010 Merapi eruption has brought blessings to the casualties. They could still continue their former occupations as farmers and breeders, some had new jobs as Merapi sand miners and traders, and their religious life was improving.

Keywords: relocation; permanent settlements; Mount Merapi eruption; socio-economic impacts; comfortable life

Introduction

Mount Merapi is the most active volcano in Indonesia and located in the southern part of Java Island. From the administrative division of the region, Merapi is right on the border of Central Java Province and Yogyakarta Special Region so two third part of the Merapi's area is in Central Java and one third is in Yogyakarta Special Region. The government divides the slopes of Mount Merapi into three categories based on the impact and risk of the mountain eruption on the people living near the location. The three categories are Area Prone to Disaster (*Kawasan Rawan Bencana/KRB*) III, KRB II and KRB I. that many dwellings or settlements on the slopes of Merapi ignore the fact that this mountain has regularly erupted and brought casualties (Ratnawati et al., 2013). The determination of region based on KRB is due to the fact that there are many residential located in the slopes of Merapi are ignoring the fact that the mount is still routinely erupted and cause casualties (Ratnawati, et al., 2013).

Despite it might be dangerous in many ways, the population living and working daily in areas are at risk of the danger of volcano flow is increasing. The population inhabiting KRB III are areas which have historically been affected by pyroclastic flows and KRB II are areas which can still be reached by loose materials such as bombs and lapilli continues to increase. In 1976 KRB III was consisted of 40,800 people, while 72,600 people were in KRB II. Meanwhile in 1995 population in KRB III increased to 79,100 people and 114,800 in KRB II (Alzwar, et al., 1988; Thouret, et al., 2000). Until 2010 before the major eruption occurred, approximately 100 thousand people were in KRB III and 140 thousand in KRB II (BPS, 2011). Most of the residents on the slopes of Merapi had land and houses with the width of more than 200 m², while their livelihood were in agriculture and animal husbandry.

In 2010, Merapi erupted twice, namely in October and November, with different eruption characteristics from previous eruptions. The Merapi eruption in 2010 was quite large with a hot volcano flow slide reaching more than 15 km from the summit, causing tremendous damage to the environment and settlements in villages which were located in the areas prone to disaster and villages around rivers. The eruption in October 2010 had damaged houses and buried a number of villages, namely Kinahrejo, Kaliadem, and Kalitengah Lor and several other hamlets. Meanwhile the eruption in November 2010 buried another six hamlets along the Kali Gendol stream. The 2010 eruption was badly damaging the nine villages to the ground or half heavily damaged, piling up 3,424 houses of which 2,636 houses were heavily damaged, 156 houses were moderately damaged and 632 were lightly damaged, while thousands of hectares of agricultural land were damaged (Hindya & Albani, 2015). The death toll reached 386 people and 15,366 people being displaced in refugee points in regencies/cities in Yogyakarta Special Region and Central Java Provinces. The refugees are those who have lost their homes or are within the radius of the hot cloud danger zone (< 20 km) (Bappenas & BNPB, 2011; Ratnawati, et al., 2013).

The 2010 Merapi eruption has caused damage and losses to Yogyakarta Special Region Province which in equal of Rp 2,141 trillion, dominated by the productive economy worth Rp 803,551 billion and the residential sector Rp 580,820 billion. In addition to these two sectors, the assessment of the lost and damaged also took into account the impact on three other sectors, namely the socio-cultural, residential and infrastructure sectors (Bappenas & BNPB, 2011; Ratnawati, et al., 2013).

After the 2010 Merapi eruption, the Government of Sleman Regency had faced various problems, one of which was providing residential for the casualties of the eruption. After going through a period of crisis, the Government relocated residents from destroyed and damaged villages to new settlements or known as permanent residential (*hunian tetap/huntap*). Most of the relocated residents were located in Pagerjuran, Kepuharjo, Cangkringan Villages. Some of the other residents were placed in villages in a safe radius. Thus, residents who survived the eruption of Merapi had to start living in the new settlements (Ratnawati, et al., 2013).

Currently in Sleman Regency there are 18 shelters (*huntap*) which located in 6 villages in Cangkringan and Ngemplak Sub-districts. The plot area for each house is 100 m² and the land for infrastructure is 50 m² per head of family (Hanindya & Albani, 2015). The Government of Sleman Regency has resettled the casualties of the 2010 Merapi eruption in permanent residential. However, recently there has been a problem due to the preference of some residents who had lived in permanent residential to return to their homes which are located in KRB III of Mount Merapi.

After about five years living in the shelters, the casualties of the 2010 Merapi eruption began to questioning the condition of the shelters. For example, those who were relocated in Kepuharjo Village, Sleman Regency, Yogyakarta Special Region began to complain the comfort of living in a shelter due to the increasing number of family members (Ardi, 2017). Meanwhile the residents living in shelters in Batur and Pagerjuran began to feel uncomfortable due to the fact that they had to live along with two or three heads of families. After living in the shelters for many years, many of them now have daughter-in-law and grandchildren so the number of family members living in the shelters has also increased. The area of the shelter which is only about 90 m² does not fit for further expansion. This gradually decreases the comfort of living in the shelters, especially for the sake of privacy for the young families.

Most of the residents living in the shelters do not own land other than those they had in KRB III Mount Merapi. They also could not build a house in KRB III due to government regulations even though they had no other land aside from the one they owned in KRB III. Considering their financial status, to buy land near the shelter (*huntap*) is not feasible for them. Currently, some residents, especially men, are forced to sleep in their cattle pens at KRB III at night due to the density inside their house since they had many family members.

Logically, the number of people living in shelters will certainly increase from year to year. This makes the shelters no longer comfortable to live in, while they can not build a new house due to the lack of land other than in KRB III. Other problems also occurred, such as difficulty adapting to a new environment, especially in adapting to the changing of employment and their agricultural land is located in KRB III which is a bit far from the current residence. The problem of the comfort of the residents living in the Merapi relocation shelter must be taken into consideration by the government so as not to cause new social problems.

From the problems arising in the shelters as described above, the purpose of this study is to examine the socio-economic impacts of the people living in Banjarsari and Jetis Sumur Shelters, as well as their level of comfort after living in the shelters for about seven years.

Research Method

This study uses a qualitative descriptive approach which using qualitative data and is described descriptively. The research locations are in permanent residential (*huntap*) located in Jetis Sumur and Banjarsari, Glagaharjo Village, Cangkringan District. These two residential are approximately 3.0 km apart and are still in the same village area. Field research was conducted in May – September 2020.

Initially, this study will use samples for data collection. However, due to the Covid 19 pandemic, primary data collection only used the field observations, documentation, and interviews with five people who were representatives of the population living in shelters in Banjarsari and Jetis Sumur. The interview took place in amidst of the Covid 19 pandemic using strict health protocols, such as wearing masks, washing hands and maintaining distance. The interviews with five residents used an interview guide to determine the social and economic impacts which emerged after seven years their living in shelters.

Surveys and field observations were conducting by performing field observations and taking several photos of the housing environment in the two shelters. Other research data were taken from secondary sources, such as textbooks, journals, proceedings and so on related to the social and economic conditions of the residents in the two shelters.



Figure 1. Map of the Research Location

Results and Discussion

Generap Description of Shelters in Jetis Sumur and Banjarsari

a. *Jetis Sumur*

Jetis Sumur Shelter is located in Jetis Sumur Hamlet, Glagaharjo Village, Cangkringan District, Sleman Regency, which is ± 10.3 km from the Merapi summit and ± 615 m above the sea level. The shelter is at the east of Kali Gendol and is on the border road of the Yogyakarta Special Region and Central Java which is a provincial road as well as an evacuation route.

The land reserved for the temporary shelter provided by the Government of Sleman Regency was $12,600 \text{ m}^2$. The residents of Jetis Sumur Shelter (*huntap*) are casualties of the 2010 eruption of Mount Merapi originally from Glagah Malang Hamlet (<https://bpbdslemankab.go.id/profil-huntap-jetis-sumur-ta-2018/>). This shelter has a total population of 324 people with 81 houses.

When Merapi erupted in 2010, in general the residential areas were not affected by the eruption with only one house affected and there were no casualties. However, many of their farmland and livestock were damaged and burned to death due to the volcano hot flows of Merapi.

b. *Banjarsari*

As for the shelter in Banjarsari, the Government of Sleman Regional has prepared an area of $28,005 \text{ m}^2$ which was allocated for building houses with a complete environmental infrastructure. Banjarsari Shelter is located in Glagaharjo Village, Cangkringan District and it had 177 shelter houses built there. The heads of family who occupied Banjarsari Shelter were affected by the 2010 eruption of Mount Merapi who originally came from Ngancar, Besalen, Kalitengah Kidul and Banjarsari Hamlets (<https://bpbdslemankab.go.id>). Some of the residents were sand miners and cattle breeders. This shelter has a total population of 712.

Ngancar Hamlet is located in the southern part of Glagaharjo Village, adjacent to two other hamlets, namely Banjarsari and Besalen. At the time of the Merapi eruption in 2010, about 80 per cent of the Ngancar Hamlet area was exposed to eruptive material with 14 deaths and one burn injury. Among all the residents' houses, only about 27 houses were still habitable.

Besalen Hamlet is one of the lowest hamlets in Glagaharjo Village. Part of the hamlet which was most severely affected by the eruption was east part of the road in Besalen Hamlet which is on the Kali Gendol side. In fact, the east side of the road in Besalen Hamlet or close to Kali Gendol was only exposed to volcanic ash at the time of the eruption of Merapi. However, the frequent rains resulted in cold lava floods which buried down the settlements on the side of Kali Gendol with material carried by rainwater and it eventually caused residential areas to be buried and agricultural lands were also destroyed. The west side of the road of Besalen Hamlet was not affected by the cold lava flood, but it was only exposed to volcanic ash.

Meanwhile Kali Tengah Kidul Hamlet is the hamlet closest to the eruption point of Mount Merapi and is the northernmost hamlet in Glagaharjo Village. Residents in this

village work as dairy farmers and vegetable farmers and some of them are cutting grass for animal feed. The eruption of Merapi in 2010 has destroyed the livelihood of the people in this village. The cows which allowed them to make money to fulfill their needs have become casualties of volcano hot flows (Ananda Citra, 2014).



Figure 2. *Jetis Sumur Shelter*



Figure 3. *Banjarsari Shelter*



Socio-economic Impacts of the Residents due to the Relocation in Banjarsari and Jetis Sumur Shelters

At the time of the research (2020), the residents had occupied the Banjarsari and Jetis Sumur shelters for about seven years. Below are the results of identification of the socio-economic impacts felt by the residents after being relocated in the two shelters.

a. Changes in Livelihood

The eruption of Merapi has changed the community's economy. Due to the impact of the post-eruption of Merapi, the residents in Banjarsari and Jetis Sumur Shelters have the possibility to raise livestock, cultivate crops, and Merapi sand mining. Most of the population experienced changes in their livelihoods compared to the time before living in shelters, one of which was that they could work as sand miners which was a new type of work for them (Cahyani, 2017).

The main activities of the residents in Jetis Sumur Hamlet before the eruption were livestock farmers (cows), making brown sugars, sand miners, looking for hays, coconut sugar distributors, and grocery store owners. However, their livelihoods have changed after the eruption and living in the Jetis Sumur shelter. Before the eruption they had cattles in a total of 168 and 9 were the casualties when the eruption occurred, but they already received compensation from the government. The number of hay seekers before the eruption could reach to 30 people, but after the eruption it was decreased to 10 people due to the fact that the others switched jobs to scavengers for used goods, making charcoal (from burned tree remains) and cutting grass around their houses. Before the eruption, 5 people owned the brown sugar industry, but after the eruption there were only 3 people because the others became the sand miners. Meanwhile, the number of sand miners increased from 10 per cent before the eruption to 40 per cent after the eruption (Ananda Citra, 2014).

As for the residents in Ngancar Hamlet, after living in the Banjarsari shelter, most of them switched jobs to manual sand miners. Meanwhile, they could still run the productive economic businesses in the form of wood furniture business which can even recruit workers from local residents although only a few of them. Economic activities in the service sector, namely carpentry and motorcycle repair, can still survive. After the eruption of Merapi, new businesses emerged, such as food traders located around the location of the eruption material stockpile. They provided food and drink for the sand miners and tourist of the lava tour tourism object.

Changes in livelihoods also occurred in the residents in Besalen Hamlet due to the 2010 Merapi eruption. Settlements and agricultural land were destroyed by the cold volcano flows flood of Merapi. Those who used to be farmers turned into sand miners and some became traders around the mines. At first, they mined sand on their own land which was covered in eruption material then after living in Banjarsari Shelter, they became sand miners along the Kali Gendol and its surroundings.

Banjarsari Hamlet is one of the hamlets which is the least affected by the Merapi eruption. However, the majority of the Merapi eruptions have an impact on changing the livelihoods. According to the residents, this disaster was a blessing due to the fact that they can use the material from the Merapi eruption as a source of their income.

Meanwhile Kali Tengah Kidul Hamlet is the hamlet closest to the eruption point of Mount Merapi. Prior to the 2010 Merapi eruption, the residents had their economic activities as dairy farmers, vegetable farmers and grass cutting. The cows which were their livelihood became the casualties of the disaster, but they were lucky due to the fact that the government was willing to compensate the livestock on their behalf. When they are relocated to the Banjarsari Shelter, the residents can resume their economic activities of raising cattles.

b. Changes in the Social Behaviour

In general, residents living in Jetis Sumur and Banjarsari Shelters still feel anxious due to the eruption of Merapi which hit them hard. When there were natural events, such as rain and power black-out so that they could only use candles as their lighting source, residents began to be fearful and panic so they reminded one another to be awared. Some of the residents experienced a psychological trauma, such as the residents were feeling excessively afraid when it was raining which came with strong winds (Cahyani, 2017).

Along with the changes in the environment where one lives, there will be changes in their daily social behavior as well. The residents always take the time to worship on the sidelines of their activities. When it was the pray time, the residents always take the time to participate in these activities without being ordered to do so (Cahyani, 2017). They became better in their religious life.

c. Living with the Neighbors

Based on the interviews with the residents living in Banjarsari and Jetis Sumur Shelters, NG (age 50) and YT (age 55) stated that since their houses were located closely to each other, they had a pleasant social life since so they felt comfort and safe. Moreover, the new neighbors were also the neighbors they had when still living in the original village. If anything happened or they needed any help, easily they asked their neighbors for a

hand. However, this close range of houses sometimes also causes social jealousy. If there are residents who buy new goods, some neighbors would be jealous of wanting to have things like that too.

d. Gardening and Waste-awareness Communities

The housing in the Jetis Sumur Shelter is cleaner, more beautiful and well-organized compared to the one in Banjarsari. The women in Jetis Sumur had a gardening community who grew ornamental plants and vegetables. They sold some of the plants and some of the profits went to the shelter and some were for their consumption.

Meanwhile the men also have 'waste-awareness' activities. They organized their waste as for the organic waste was to the animal feed, while they collected paper, plastic and iron waste in 'waste-awareness' homes to be sold to collectors. The profits from the sale were put into the shelter cash office. Whenever there are recitations, celebrations and other events, the residents would not be charged for fee anymore. The cash they saved would be using for the purposes of these joint activities.

e. Conditions of the Shelter Buildings

Each house unit in Banjarsari and Jetis Sumur Shelters is 90 m² and the Building Basic Coefficient per unit is a maximum of 50 per cent referring to the Sleman Regional Regulation No. 27/2011 concerning the Mechanism of Permanent Residential Development Post-Eruption of Mount Merapi.

The 90 m² house has two bedrooms. Based on the results of interviews with residents in the two shelters (NG, age 50 and SY, age 47), the two bedrooms were sufficient for them and it was comfortable. Most of the residents in the two shelters have at most two children. So that the area of the plot of 90m² is sufficient for them. The house is occupied by at most two heads of family. If they had married children, they usually would live with their parents for a while.

According to the informant (NG, age 50), there was one house in Jetis Sumur Shelter which was sold due to the resident moved to Sumatra following their relatives. The house was sold to another relative who both lived in the shelter. The house was intended for their child who was married so that they lived not far from their parents. According to the informant, the certificate of the house being sold could not be legalized under the name of the new owner, but it did not cause a problem since the original owner was still a relative.

Some residents also mortgaged their land certificates. The money would be using to renovate houses, upgrade houses, and additional business capital. Therefore, some houses look better than others as the result of mortgaging their land certificates.

f. Environmental Security

For the security issues, their home environment was considered safe due to the location is close to one another. Therefore, there is no night patrol activity in the shelters. Night patrols were only conducted for the safety of their communal cattle pen which was located behind the shelters.

Level of Residents' Comfort after Settling in Banjarsari dan Jetis Sumur Shelters

It is not easy to live their life after the 2010 eruption of Mount Merapi, especially for residents who before 2010 had lived on the slopes of Merapi. They were born, grew up, went to school, worked on the slopes of Merapi. Mount Merapi has erupted many times, both in small and large scales and has destroyed their homes and rice fields. However, in the early days after the 2010 Merapi eruption, they did not feel like moving from their original location due to Mount Merapi was their source of livelihood because most of whom were farmers. Fertile soil on the slopes of Merapi is suitable for farming and to the grass to grow which became the food for the cattles owned by residents living in the slopes of Merapi.

Unfortunately their home village which is included in KRB III was uninhabitable. Moreover, due to the 2010 Merapi eruption, their houses and garden land were badly damaged. This situation finally forced them to follow the government's advice, that was to be relocated to a safe place and the location was still close to their old house. The relocation shelters were in Banjarsari and the Jetis Sumur. The two shelters were about 3.0 km apart from each other, and about 10 km from their home village.

According to informants YT (age 55) and SM (age 49), at the beginning of their staying in the shelters, they did not feel at home due to the environment of the shelters was completely unfamiliar to them, even though the neighbors were still the same their old neighbors. The most influenced issue was the livelihood due to the fact that they did not know what to be done there. Previously most of them were farmers and cattle ranchers, while the agricultural land on the slopes of Merapi was still uncultivated and they have lost many cows due to the eruption. Changing jobs is also not easy because they only have the skills to be farmers and cattle ranchers.

Over time some of them became sand miners, mining the Merapi sand which drifted and settled on the sides of Kali Gendol, which was located not too far from their shelters. Gradually some of them were able to change jobs. Meanwhile, those who used to be farmers and ranchers were finally able to continue farming on their farms on the slopes of Merapi. They also received assistance from the Government in the form of cattle to be raised. For the traders, eventually they can also sell goods by building shops near their shelters. This means that some of them have changed jobs, but others have continued their previous jobs which they previously performed in the old village.

Most of the houses in Banjarsari and Jetis Sumur Shelters were in good condition. Some of the residents have been able to renovate their houses, such as making the second floor because the land area of 90 m² cannot be expanded, some houses were repainted, and so on. They also had a high awareness of environmental cleanliness, especially the residents who lived in Jetis Sumur Shelter. The housing conditions in Jetis Sumur Shelter were clean, well organized, the yard and vacant land were also planted with flowers. So the condition of this shelter was fresh and shady due to the plenty plants. In general, the condition of the housing environment in the two shelters was moderately in good condition. Most of the residents were satisfied and comfortable living in the shelters.

After about seven years they lived in Banjarsari and Jetis Sumur Shelters, they had made peace with the situation. According to informants PR (age 52) and SY (age 47), they have accepted their current life, unlike when they first lived in the shelters. In terms of work, they have also worked according to their abilities. Some continued their former work as farmers and ranchers, while some had new jobs as sand miners, trade and others.

Therefore, the level of comfort of life for the majority of residents in Banjarsari and Jetis Sumur Shelters was good. Over time, they have become comfortable living in their current homes. They no longer wanted to return to their old houses. In this new place, they have been able to deal with various socio-economic problems which occurred at the beginning of their stay in this shelter. At the end, they have been able to continue living a normal life like other people in general.

Conclusion

Based on the descriptions in the previous chapters, it can be concluded as follows.

- The most obvious socio-economic impact of relocation in Banjarsari and Jetis Sumur Shelters is a change in the type of livelihood and social behavior. Some of the new type of livelihood which emerged were sand mining and trading. Meanwhile the real change in social behavior are shown in some residents who were still feel afraid when there was heavy rain along with the strong winds. Another change is that the religious life of the residents was getting better as they always took the time to worship in between their activities.
- After about seven years the residents have lived in Banjarsari and Jetis Sumur Shelters, they have made peace with the situation. They have accepted their current life which was different than the early days of living in the shelters. The residents were comfortable and felt at home in Banjarsari and Jetis Sumur Shelters. They had no more wish to return to their original villages.
- Implication of this research shows that the 2010 Merapi eruption has brought blessings to the casualties of the eruption. They could continue their former work as farmers and ranchers, while some had new jobs as Merapi sand miners and traders. Furthermore their religious life was also getting better.

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