Assessing Community’s Socio-Economic Enhancement in Post Disaster Recovery: Case Study of Mount Merapi

Ramanditya WIMBARDANA¹, Saut SAGALA¹, Alpian Angga PRATAMA¹, Anastasia Ratna WIJAYANTI¹ and Arief ROSYIDIE¹

Abstract
Post disaster recovery often focuses on physical recovery while neglects the socio-economic enhancement in community. It is partly due to physical recovery is more tangible and largely affect the community in the short term. However, recovery activities may become unsustainable if the social impacts have not been fully restored. Learning from case of post disaster recovery in Mt. Merapi, the present study investigates community’s socio-economic enhancement after the 2010 Mt. Merapi eruption. This paper applied qualitative survey by in-depth interview to vulnerable groups that may have been affected by the eruption and actors that have been involved in the recovery process, such as Non Governmental Organization (NGOs), and local governments. We also observed socio-economic situation in the Mt. Merapi community after the disaster and looked for recovery assistance from the agencies. Many members of community have lost their main livelihood on agriculture and livestock. In light of this disaster, however, this study found that the community has capacity to cope with the socio-economic impact and domesticate natural resource in the volcanic environment for their livelihood. For example, they established and managed volcano tourism that attracts many tourists to visit the site of the physical destruction in Umbulharjo Village. This study found that the existing of social capital in the community largely affect the enhancement process and result. Nonetheless, there is still missing connection between the community self-help recovery and the government recovery that remains a challenge for community resilience. This study recommends that active collaboration and mediation between local government and community leader would result to enhancement on achieving sustainability.

Keywords: community, Mt. Merapi; recovery; socio-economic

1. Introduction
Many people survive the initial disaster, but then suffer after it. The impact is not only physical impact, but also they could face the economy stagnates, social networks weaken, and health care and support services decline (Olshansky and Chang, 2009). Considering the social impact that may follow after the disaster, they should cope and deal with it to redevelop their normal life and to maintain their long-term sustainability (Smith and Wenger, 2007; Tobin, 1999). However, post disaster recovery often focuses on physical recovery while neglects the social enhancement in community. It is partly due to the physical recovery is more tangible and largely affect the community in the short-term (Lindell and Prater, 2003). Physical impact can be recovered in the

¹School of Architecture, Planning, and Policy Development, Institute of Technology Bandung, Indonesia, ramandityawimbardana@gmail.com
short-term time, but social impact can create and aggravate social inequality for long-term period (Gordon, 2004; Olshansky and Chang, 2009). On the other words, community may become unsustainable if the social impacts have not been fully restored.

The 2010 eruption of Mt. Merapi (Indonesia) is known as ‘100’ year’s event which brought devastating disaster for the community who lives around its flanks. In that time, it generated tephra plume that reached 12 km altitude, released SO$_2$ emissions much larger than recorded during previous eruptions (from 1992 to 2007), resulted more than 280 lahar events along 13 rivers, and produced pyroclastic density flow currents that cruised 8 km down the Kali Gendol River and Kali Kuning River drainages channel on the south flank of the volcano (Surono et al., 2012). As result, 367 people were killed, 400,000 people were evacuated, and 2,300 houses were collapsed. The volcanic hazards also ruined infrastructures (such as dams, bridges, roads, etc).

The 2010 eruption also ruined local community’s economic assets, such as farmland, farming infrastructure, water storage, and livestock. Bappenas and BNPB (2011) estimated that the economic sector was the most suffered sector caused by the 2010 Eruption of Mt. Merapi. The economic damage and losses assessment entailed agriculture, fisheries, small-medium enterprise, and tourism. The damages and losses assessment calculated that the economic impact reached approximately 169 million US$ or 46.4% of overall damages and losses calculation. These kinds of physical destruction of economic assets could be followed by community welfare problem, such as job losses and poverty (Skoufias, 2003).

Some recovery strategies must be done to restore socio-economic condition after disaster. These were very important to encourage community to meet their basic need and to back on its feet as before or even better (Tobin, 1999). Therefore, they can maintain their sustainability in short term and long term period. However, to accomplish need greater understanding of present socio-economic impact and how to community recover from it. Taking case of post disaster recovery in
Mt. Merapi, the present study is aimed to investigate community’s socio-economic enhancement after the 2010 eruption. A better understanding of current disasters social impacts and its recovery can contribute the development of recovery plans to prevent long-term consequences from occurring (Lindell and Prater, 2003; Olshansky et al., 2006; Tobin, 1999).

To achieve the whole representation of socio-economic enhancement by the community in Mt. Merapi, this paper outlined some theoretical background that focused in social impact and social recovery. The third part of this paper gives information of study location. Then, the fourth part of this paper discusses our findings in Mt. Merapi community. The article concludes the findings and some policy recommendations for governments and non-governmental actors.

2. Social Recovery in Post Disaster Situation: Literature Review

This following section discusses socio-economic recovery according to existing literature. First, we discuss about social impact of disaster concept. Second, how community recovers socially will be reviewed.

2.1 Social Impact

The root of changed condition after disaster is a result of risk constructed by the combination of natural hazards and vulnerability in the pre-impact time. Disaster will occur when there is an interaction between those factors. Wisner et al. (2004) stated that there will not be a disaster if there are hazards, but there is no existing vulnerability in the society attribute and their physical environment, or there will not be a disaster if there is a vulnerable society, but there are no hazard exposures that may occur in their environment. They also argued that a disaster occurs when a number of vulnerable people experience a hazard and suffer severe damage and/or disruption of their life and they cannot cope with the risk or the impact.

This concept can be described in terms of models proposed by Wisner et al. (2004), Lindell and Prater (2003), and Cutter and Enrich (2006). In the models, hazard exposure, physical vulnerability, and social vulnerability create unsafe condition in both nature and society. Vulnerability is a set of characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (Wisner et al., 2004). It is a combination of susceptibility factors embedded in people physical and social attribute, including livelihood, property, and other assets. Disaster risk will increase when hazard exposure exists. It arises when both physical and social vulnerabilities lie where it could be threatened by the probability of hazardous materials releases from the hazard source. Therefore, when the catastrophic event occurs, both the physical and social susceptibility lead them to damage and losses severity and they are less able to cope from risk or disaster impact (Cutter and Enrich, 2006).
Figure 2. Disaster Impact Model

We adapted from the disaster impact model developed by Cutter et al. (2003), Cutter et al. (2008), and Lindell and Prater (2003) (Figure 2). As shown in the figure above, the physical impact of disaster is the primary forms of devastation – casualties and damage – by natural hazard. The physical impacts of disasters include casualties (healthy, deaths, and injuries) and structural damage (infrastructure, public facilities, properties, etc). On the other side, social impacts are divided into psychosocial, demographic, socio-economic, and political impacts. Despite of the difficulties of measuring the social impacts, it is nonetheless important to monitor them because they can cause significant problems for the long-term functioning of specific types of households and businesses in an affected community (Lindell and Prater, 2003).

After a disaster occurs, there are some group of people that may feel health and mental degradation. This impact is called as psychosocial impact includes fatigue, gastrointestinal upset, confusion, impaired concentration, attention deficits, anxiety, depression, and grief (Lindell and Prater, 2003). They also include behavioral effects such as sleep and appetite changes, ritualistic behavior, and substance abuse. These include children, frail elderly, and people with pre-existing mental illness, racial and ethnic minorities, and families of those who have died in the disaster. Six years after devastating tsunami in 2004, Acehnese survivors still had felt traumatic feeling of losses and disaster event and it became major circumstances to face the substantial changes caused by the devastating disaster (Irmansyah et al., 2010).

The major demographic impact of disasters is the social problem that may follow because of the destruction of dwellings (Lindell and Prater, 2003). They have to face many problems when they build back their house, such living in inadequate temporary shelters, logistic and aid distribution problem, living in temporary house with non-preferred location and structures, social cohesion depletion. Steinberg (2007) portrayed the community structure and cohesion in Acehnese people had been set apart by the mega tsunami in 2004, as many local community leaders died and many communities were separated into barracks and tents. As a result, it was hard to gather them in community meeting. There are also an increase number of emigrations of population segments that have lost housing (Cutter et al., 2003). In some cases, displaced people leave their neighborhood for temporary reason, such traumatic feeling, loss of job or community assistance, and conflict. For instance, approximately 30% of the population of New Orleans had not yet returned for three year since Katrina, and permanent repairs had just begun after they came back (Olshansky and Chang, 2009).
From household perspective, the main socio-economic impacts of disasters are direct economic losses in damaged properties or assets that used to be community’s main incomes (Ding et al., 2011; Lindell and Prater, 2003). Some of these cannot be replaced, so their loss causes a reduction in consumption (a decrease in the quality of life) or a reduction in investment (a decrease in economic productivity). Other assets can be replaced through either donations (e.g., food and clothing) or commercial purchases. There are also indirect of economic losses, especially the flow of resources between social units within a community. It can be defined that the resources, especially money, must be paid for products, services, economic inputs, and infrastructure support. The victims commonly have insufficient financial for buying service and materials aftermath. Number of unemployment also increases when many business close or move after disaster, so low-income workers are difficult to get new job (Lindell and Prater, 2003; Morrow, 1999; Olshansky and Chang, 2009).

In many cases, post disaster situation often leads dynamic social activism that bring political disruption after the disaster event (Lindell and Prater, 2003). Many cases of political impact is related to social relationship conflict between people at different level, such relation within household, between men and women, between different ethnic groups, between children and adults, and between citizens and their government (Wisner et al., 2004). An inequities external assistance distribution and decreasing quality of life drive to conflict between social units and also the agency. For an example, there was disproportionate distribution of the external assistance distribution in Pangalengan Sub-District (West Java) after the 2009 earthquake. Due to the belief of some leaders, some residents who did not the same belief were forbidden to receive relief distribution and it led to social conflict between the neighborhoods (Wimbardana and Sagala, 2012).

2.2 Social Recovery

From the previous section, we recognized that disasters leave physical environment destruction, social disruption, and economic stagnation which have critical impact to human lives. To avoid greater human, physical, and financial loss in the future, policy makers and praticioners are challenged to recover from those major impacts. Recovering from a disaster is a complex process and involves communication and coordination with many different agencies and individuals (Johnston et al., 2012). Despite of challenges in the recovery process, the recovery phase offers important development opportunity to restore, rebuild, and reshape the affected area that it could reduce future vulnerabilities and affect sustainable development outcomes (Berke et al., 1993; Olshansky and Chang, 2009; Smith and Wenger, 2007).

Appropriate recovery approach could provide a monumental window of opportunity to rebuild community stronger than before the event, reshape the existing social and economic system, and enhance disaster resilience. Many strategies can be done, such as the repair and improvement of damaged buildings and infrastructure, stimulating local economic, enhancing public capacity and awaraness tool hazard, etc. The failure approach can lead to new or greater vulnerability, such as poor reconstruction quality, a loss of jobs, a reduction in affordable housing stock, missed opportunities to incorporate mitigation into the rebuilding process, and an inability to assist the neediest recover (Smith and Wenger, 2007).
To implement the strategies, the recovery is influenced by the ability of an individual, family, group, class or community to use resources and access the resources (Wisner et al., 2004). The source can be acquired from community recovery resources and extra-community assistance. Community recovery resources can come from a variety individuals and Community Based Organizations (CBO). The victim might have financial asset (e.g. savings and insurance) and tangible asset (e.g. property) that undamaged by hazard impact. Lindell and Prater (2003) said that there are also another way to bring additional resource through overtime employment and freeing up the needed finds by reducing their consumption. Friends, relatives, neighbors and CBO can contribute financial resource and help the victim with in-kind contribution. Extra-community assistance can come from NGOs, regional governments, national government, and foreign government. They can provide financial resource and financial assistance that do not need repaid by the victim or loans that might be offered at below market interest rates.

Morrow (1999) categorized four resources that could be used for recovery, including economic resources, personal resources, family and social resources, and political resource. In the term of disaster recovery, people earn a livelihood with differential access to material, social and political resources to get back to "normal life" after disaster. Access to such resources is always based on social and economic relations, including the social relations of production, gender, ethnicity, status and age, meaning that rights and obligations are not distributed equally among all people (Wisner et al., 2004).

Household possess different personal resources: health, physical ability, personal experience, education, time, and skills (Morrow, 1999). Health and mental illness can gain psychiatric diagnosis and most benefit more from a crisis or trauma counseling. The personal experience, education and skills possessed by household can significantly influence the recovery, such as better preparedness and appropriate behavior for future disaster response, gaining access to resources, better employment opportunities, dealing with bureaucracies and many more. For example, many victims of the 2004 Indian Ocean Tsunami were trained special skills, such as small and medium scale entrepreneurship, fishing, planting, etc., by many agencies in order to enhance the household economic recovery (Thorburn, 2009).

Economic resource can be recovers with financial assistance through grants for buying service and materials in aftermaths. Some of the specific mechanisms for financing recovery include obtaining tax deductions or deferrals, unemployment benefits, loans (paying back the principal at low- or no-interest), grants (requiring no return of principal), insurance payoffs, additional employment, depleting cash financial assets (e.g., savings accounts), selling tangible assets, or migrating to an area with available housing, employment, or less risk (in some cases this is done by the principal wage earner only) (Lindell et al., 2006).

Family and social resources are related to social capital (Morrow, 1999). Lack of social capital can be a limiting factor to seek recovery assistance. Nakagawa and Shaw (2004) defined that social capital refers to the trust, social norms, and networks which affect social and economic activities. Recently, scholars have sought to link the speed and effectiveness of the process of recovery to levels of trust and social capital. Aldrich (2010) and Nakagawa and Shaw (2004) that the resources is available to individuals through their social networks. Social capital can serve as informal mechanisms allowing victims to support networks for the sharing of knowledge, the sharing of financial need, the sharing of market information, the sharing of
logistic and physical assistance, and claims for reciprocity in times of crisis (Adger, 2003; Aldrich, 2010). Furthermore, social capital may drive into community collective action for recovery, although capable agencies are also required.

The disaster recovery period is the source of victim dissatisfaction and this creates many opportunities for community conflict. This conflict could be resolved to apply political right and access to decision makers (Morrow, 1999). In many cases, recovery of this political impact is facilitated when neutral recovery organizations hire local mediator to provide a link between these conflicted communities (Berke et al., 1993).

3. Method

This research was conducted using qualitative analysis in order to understand the process of impacted community doing the resilient strategy after the eruption happened. Qualitative analysis is also important because this research method not only allows to study about the community, but also study from the community (Fife, 2005). There are two approaches to conduct this research, which are macro and micro approach. The macro approach was done through desk study and thus the secondary data was derived. The secondary data consists of papers, government’s document and policy, information from newspaper and any other mass media. This approach delivers information about the whole post disaster recovery situation and the process in Mt. Merapi community. The micro approach was done through the direct observation and interview in the location study. This approach was applied to explore actual cases of socio-economic impact and enhancement after the physical destruction of community’s assets and properties. Both macro and micro approach’s data are accumulated from surveys conducted in April 2012 and July 2013.

This research was conducted in Umbulharjo Village, Kepuharjo Village, and Glagaharjo Village Cangkringan Sub-District, Sleman District. These villages were affected heavily by the recent 2010 volcanic eruptions. Many of villagers from both village live at relocation camps built in the their original village or even in different village which is far from their previous village. During the fieldwork, we visited six relocation camps in seven different villages: Karangkendal and Plosokerep (Former Umbulharjo Villager), Batur and Pagerjurang (Former Kepuharjo Village), and Kuwang and Dongkelsari (Glagaharjo Village). The fieldwork is also conducted in Volcano Tour area in Umbulharjo Village. All of those are located in north part of Yogyakarta City, the capital of Yogyakarta Province.
Purposive sampling and snowball was done to obtain the informants. The interviews were semi-structured, open-ended, and directly related to main information which gave the interviewees more freedom to narrate their experience with flow. Interviewed community members (n = 35) were classified to vulnerable groups who could be affected in socio-economic aspects by the 2010 eruption. They are vulnerable because their livelihood is depended on natural resources provided by volcanic environment (Kelman and Mather, 2008). They are cattlemen (n = 7) and tourism workers as follows: restaurant owner (n = 5), jeep drivers (n = 3), motor trail driver (n = 5), ojek\(^2\) driver (n = 3), parking servant (n = 3), souvenir sellers (n = 5) and ticketing officer (n = 4). The interviews were also carried out to local government agency, including Village Government, Planning and Development Agency, Tourism Agency, and Agricultural Agency, and NGOs. They were carried in order to know the role of each organization in helping the community to have the resilience.

The interview result are recorded by tape recorder and systematically arranged in transcript then. Because of the broad nature of the qualitative data, a sorting process followed, with segments of each interview placed in various content categories. We did a triangulation of different data resources, because it may also enhance the quality and reliability of the data. The qualitative data

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\(^2\) Ojek is an unlicensed motorcycle taxi carrying one passenger and sometimes two passengers.
analysis focused on the content of participant statements. The final goal is to combine information patterns into wider and more objective analysis patterns.

4. Result

According to the previous literature and research findings in Mt. Merapi, we considered that the community in Mt. Merapi rely their well-being to natural resources provided by the volcanic environment, such as raising cattle, cropping, rock and sand-mining, and tourism activity (Dove, 2008; Sagala, 2009). Normally, the sand and rock mining activities are available along the river valleys which channelled the lahars from Mt. Merapi eruptions in the past time. The agriculture activities get benefit from the mild climate on the upper slopes of the mountain. The tourism activities include renting the rooms in the weekend, providing sightseeing of the mountain. However, the 2010 eruption brought massive destruction including those livelihood resources. This part will be focused on our findings about what is the socio-economic impact and how can they bounce back from the impact.

4.1 Socio-Economic Impact

Agriculture sector experienced a decreasing total of farmland area after the disaster. A million cubic volcanic materials of eruption ravaged approximately 1,865 ha of productive farming fields which half of the destruction is located in Sleman District (Wahyunto et al., 2012). Traditionally, this region is well-known as subsistence tropical agriculture area producing of rice in lower slope and cash crops in upper slope, such as tobacco, corn, maize, chili peppers, tomatoes, watermelons, taro, carrots, bananas, cabbages and peanuts (Wilson et al., 2007). Yet, the volcanic eruption harmed and buried the farmland. Bappenas and BNPB (2011) calculated that total damage in cultivation sub-sector was US$ 5.95 million and total losses of productivity was US$ 27.7 million.

![Figure 4. Type of Land Use/ Land Cover Damaged by Mt. Merapi’s Volcanic Material in the 2010 Eruption in Yogyakarta and Central Java](image)

*Source: Wahyunto et al. (2012)*
While there has not been any report that record the trend of agriculture production after the 2010 eruption, the farming productivity around Mt. Merapi is predicted to be declining for short term period after the eruption occurred. Based on our interview with InFront, a local NGO who specializes in farming and forestry, there will be a period which several farming production will either decline or be stagnate because some type of plants were damaged by volcanic ash. Uyung, the Chairman of InFront argued:

“After the eruption, we could find many snake fruit plants were damaged by the volcanic ash. Consequently, the damaged snake fruit plants that had been in mature stage were failed to be harvested. However, based on our research, the plants are still productive, but it will take two years to recover from the damage and to return their productivity as before.”

Nonetheless, plants recovery is very dependent on its type. Wilson et al. (2007) observed after Mt. Merapi eruption in 2006 that root and low-growing vegetables, such as carrots, potatoes, onions and cabbages, were resilient to ash fall or the level of damage was low. These vegetables tend to be shielded by taller plants (such as chilli peppers, tomatoes, tobacco or peanuts) which provided a tephra-shadow effect. Tobacco is very vulnerable because its large and hairy leave trapped the ash. It needed four weeks to recover by sprouting new leaves.

The volcanic materials also swept away community’s livestock in the 2010 eruption. Mostly, the community represent their livelihood through animal husbandry (e.g. cattle, oxen, sheep, goats, chickens, and ducks) to produce and to sell its meat, egg, and milk (Dove, 2008; Wilson et al., 2007). The upper slope of Sleman District is well-known as the regional center of milk production in Yogyakarta. In 2009, there were 5,265 dairy cattle producing an average daily milk production of as much as 15.1 tons (The Government of Sleman District, 2013). During the eruption 2010, the lahar and pyroclastic flow killed approximately 21% of cattle population, in Sleman District (Priyanti and Ilham, 2011). Poor evacuation management, plenty of cattle to be evacuated, uncertain day-care cost and limited capacity at evacuation camp led the livestock to be abandoned in community village, and only few of cattle could be saved to evacuation camp (Mei et al., 2013; Priyanti and Ilham, 2011).

In addition, survived livestock had to face following health, feed, and productivity problem after the disaster event (Mei et al., 2013; Sani and Estuningish, 2011). Many of survived cattle had burnt scar, weight loss, diarrhea, and respiration problem caused by volcanic ash. They are fed in poor stall by with ash-covered grass, inappropriate fodder nutrition (such as cassava, banana tree leaf, and jackfruit) and limited fresh water storage. Therefore, this condition caused to declining milk production. For instance, before the 2010 eruption, milk community cooperation in Arobinangun Village (Pakem District) had 2,800 cattle which could produce 5,500 liter/day. Right after the eruption event, they were lost about 964 cattle and they could produce only 350 liter/day. Farmers who were not able to feed up their cattle preferred to sell it when the price was at low prices3 (300 to 500 US$) during the eruption period (Mei et al., 2013). Animal husbandry damage and losses in Sleman District was estimated around 9.6 million US$ (Bappenas and BNPB, 2011).

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3 The regular price for female cow in Yogyakarta and Central Java region was around 700 to 1000 US$ before the 2010 eruption
The physical damage and losses of economic assets have affected indirectly to local people livelihood. Based on our interview with former cattlemen, they had to lose their previous jobs and main income since their livestock are dead or sold right after the end of emergency period. According to Umbulharjo Village’s demography data (Cangkiringan Sub-District) in 2008 and 2011, cattlemen number in Umbulharjo Village decreased from 2,520 people in 2008 to 327 people in 2011. They had several reasons why they stopped keeping and raising cattle. First, they did not have enough money to buy, keep, and raise cattle while they had to rebuild their dwelling. Second, some proper feed nutrition (e.g. fresh water resource and no ash-covered grass) was limited in Mt. Merapi’s environment and the price was expensive in markets. Third, they lived at shelter camp where there was no adequate stall to keep and raise cattle. As a result, there were not only cattlemen who were lost their main livelihood because of their cattle death during the eruption, but also those who still had cattle after the eruption also experienced the same situation.

The buried farmland in Putih River riverbank, southwest flank of Mt. Merapi, also affected local people livelihood in this region (Pamungkas, 2012). Approximately, 73% of land use in this area was farmland cultivated by around 80% household from 10 villages. Since the lahar event inundated their farmland, they tend to did nothing for short term period because they could not plant anything and the agriculture commodities were damaged. They needed more than two years to excavate sand and rock from their farmland and to start planting.

4.2 Socio-Economic Recovery

Certainly, the people in Mt. Merapi need to recover their livelihood downturn and economic crisis after the devastating disaster. They also need to have steady income to meet their basic daily needs. To achieve these, they have done some strategy to recover from the socio-economic impact using their own resources and/or community assistance by various agency. In this part, recovery strategy and community’s socio-economic enhancement will be discussed according to our observation and interview with local community members during the fieldwork and recent literature sources.

4.2.1 Coping with Socio-Economic Impact in the Early Recovery Phase

Right after the end of emergency phase, the government of Indonesia helped the victims by “buying” their dead livestock, especially cattle. Based on our interview with local agricultural agency in Sleman District, this policy was aimed to enhance household economic recovery after the devastating disaster. The compensation price of cattle was based on cattle’s milk productivity: 850 US$ for a cow, 550 US$ for a heifer and 350 US$ for a calf. Instead of using the cash for restoring their livelihood resources, the beneficiary tend to use it as saving to meet basic need during living in emergency shelter, such as food, clothes, children’s education needs, and rebuilding their dwelling.

“I used to raise some cattle, but they were killed by the hot cloud. Then, the government indemnified them with some money” Tourism worker 1 – Former Cattleman

“As poor people, I used the cattle compensation for my family basic need, paying my children’s education cost, and rebuilding my house.” Cattleman 2

Farmers in Putih riverbank area had different challenge to cope with the physical destruction of their farmland. Since they did not receive any compensation for their buried farmland and loss of
productivity because of harvest failure, they had to recover their farmland by excavating sand, rock, and clean ash by their own initiative (Pamungkas, 2012). Cooperating with sand mining business which emerged after the eruption, they sold the sand and the rock to them and they also got their farmland back. Then, since the irrigation was harmed by lahar and no major reconstruction had been finished, they cultivated it with seasonal plants which can grow in dry environment, such as chili, beans, and vegetables.

Based on our interview, the community who live in Kepuharjo Village, south flank of Mt. Merapi, also did this strategy too. They excavated their buried house in their previous village to sell the materials to sand mining company. The money was used to help them to recover their economic condition. After the excavation process will have been done, they do not intend to settle in there because the land is in the forbidden area of Mt. Merapi. To make it productive, they plan to plant cash crop and domesticate the product for domestic consumption.

On the other side, there were a few of people who could access resource from their own saving and family/relatives. Other financial resources were come from cooperation loan and in-kind donation. So, they used the compensation for restoring the livelihood resources. However, they had to start their work from nil. For example, they had to start raising calf which was not mature enough to produce milk.

“Until now [July 2013], my children always send me money to fulfill my daily needs. They also helped me to buy some land to build a new house where I live now. So, my compensation money was used to buy two calves and house materials.” Cattleman 6

“I withdrew my saving for buying some calves, but they have not produced any milk yet [April 2012]” Cattleman 3

“I lent a calf from milk cooperation in Kepuharjo Village. The agreement allows me to raise cooperation’s calf until it becomes a cow and bears a calf. Then, I have to give it to the cooperation.” Cattleman 7

However, there were community members who did not use the financial assistance to restore their previous livelihood. There were many difficulties and challenges to undertake animal husbandry and planting (see 4.1 section). So, many of them tried to change their livelihood. For instance, the establishment of tourism area in Umbulharjo Village in December 2010 attracted
them as a new opportunity to get income (see 4.2.2 section). They used the compensation to purchase capitals that support them while working in there.

“I received the compensation from the government. I used the money for purchasing a motorcycle, so I could provide ojek service in here (Volcano Tour area). So, I can earn some money from it, and then I am able to buy a motor trail.” Motor Trail Driver 1

Figure 7. A Cattleman and His Cow in Kepuharjo Village
Source: Field Observation, 2013

4.2.2 The Establishment of Volcano Tour and Its Role to Community Recovery

Apparently, there was a blessing in disguise behind the disaster. The 2010 eruption of Mt. Merapi not only conferred massive destruction to the environment, but the demolished environment became a new tourism attraction. They came to the area because they were curious to see what natural phenomena had done in destructing people’s life.

However, at first, the demolished area was unmanaged. The local community created illegal ticket to enter the tourism area in December 2010. Apparently, such activity made the visitors felt not comfortable, therefore the head of Umbulharjo Village, hamlet leaders, and some of local figures initiated to manage the tourism area. As argued by Sagala (2009), the community in Mt. Merapi tends to take action because of hamlet leader’s instruction. In March 2011, they established a tourism management by an agreement between them and they also opened the tourism area with official name: the Volcano Tour (Figure 8).

“In that time (December 2010), visitors reached 6000 – 7000/day, but the tourism area was out of managed, such as no rule for safety standard, environment protection, and community assets protection. Each visitor have different purposes to visit there, for instance taking photo, watching the demolished houses, or even stealing community properties. So, we (the head of Umbulharjo Village, hamlet leaders, and some of local figures) initiated to form a management and a set of rules that manage the tourism area. However, we worked without government’s support” Badiman, The Head of the Volcano Tour Management
The Volcano Tour provides three objects that can attract both local and foreign tourist. These objects are as follows: first, the grave of Marijan, the late gate keeper of Mt. Merapi who died in the eruption of 2010, second, objects or built environment that destroyed by the eruption and third, volcano tour drive to the large scale devastated area by the volcano eruption. The local people provided motor trails and jeeps for single and group passengers. Apart from these attraction objects, the mountain scenery and the temporary facilities provided by the local people added to the comfort of visiting the volcano tourism.

To take benefit from the Volcano Tour existence for local people, the tourism management applies some strategies. First, it manages the money obtained from the ticket and to decide how the money is distributed among the people and public purpose. Second, the management encourages participation from the villagers of Pelemsari and Pangukrejo, two hamlets in Umbulharjo Village where the tourism area is located, to take role as tourism servant. The management has a rule that those who are allowed to work in the tourism area are the people who lived in Kinahrejo and Pangukrejo before the eruption. This is because the tourism area is located in those hamlets. In this case, the social network is growing because the people came from the same location and those who did not come from Kinahrejo or Pangukrejo Village are not allowed to work in the tourism area.

Obviously, the existence of the new tourism has been successfully helping the community to rise from adversity. They could work for tourism services: ojek driver group, motor trail driver group, jeep driver group, souvenir seller group, food seller group, and field officer group. This opportunity then attracted them and started new jobs in the tourism arena. As the Volcano Tour had created the new job opportunity for people, it also helped people to earn money. Although some tourism workers admit that their income gained from tourism activity was less and more stable than as a cattleman or planter, but it is sufficient enough to help people fulfilling their
daily needs. In addition, the profit gained from the entrance ticket selling is also used for the independent house reconstruction (Figure 9). Therefore, the tourism activity in the Volcano Tour area is a kind of community self-help recovery programme and it has helped people to bounce back from disaster.

“In the past, my cows could produce milk that provides sufficient income for a month. Now, our income is depended on tourist’s visit. There are some times that the number of visitors is not as many as holiday time.” Ojek Driver 1

“Now, I work as both cattleman and ojek driver. However, my cattle are still calves. So, they have not produced any milk yet. I work for ojek driver as alternative job to enhance my income. Yet, I am trying to back as cattleman again” Ojek Driver 2

![Figure 9. Ticket Revenue Share](image)

**Figure 9. Ticket Revenue Share**

*Source: the Volcano Tour Management, 2012*

5. Conclusions

This paper reveals that the eruption 2010 of Mt. Merapi not only affected physical destruction to local community’s economic assets, but also they could not avoid the following socio-economic problem. Both plantation farming and animal husbandry are the most suffered sub-sector since the volcanic materials mostly struck, swept away, and damaged the community’s agriculture resources, such farmland, farming infrastructure, water storage, and livestock. Therefore, many people had to survive in the condition which they had to face economic stagnate because of the potential declining agriculture production, loss of job, and decreasing household income. Many difficulties hampered local inhabitants to restore their economic condition, for instance 1) insufficient of natural resources around Mt. Merapi environment that it support their livelihood (e.g. water resource and livestock, 2) the increasing price of livestock’s fed, 3) the decreasing of livestock’s health and productivity, and 4) inadequate infrastructure to support livelihood restoration.

In light of the devastating disaster, however, this study found that the community has capacity and find strategy to cope with the socio-economic impact. They domesticate both natural resource in the volcanic environment and financial assistance to re-establish their livelihood. The
existence of volcanic materials in their buried land and properties are exploited to help them to earn money and get their assets re-productive as before. The financial assistance (e.g. government compensation and in-kind donation) could help community’s economic situation to meet their basic needs situation or started working. While some of local people used it for short term period when living in shelter camp, there were also people who has sufficient financial resources invested it for either restoring their previous livelihood or preparing for new/alternative livelihood.

This paper has examined the potential how a volcano hazard prone offers benefit through volcano tourism to the communities living on the slope of the volcano. The huge impact of the volcano eruption has become a strong attraction for people and become a source of income for local community that works in the tourist area. The Volcano Tour not only had created the new/alternative job opportunity for local people, but it also helped people to earn money. While the income obtained from the tourism activities is still less than the income they received from working as before, the existence of the new tourism has been successfully helping the community to rise from adversity.

The community recovery process in Mt. Merapi is largely affected of the existence of leadership, social network and community participation. For example, the role of the leaders is important in organizing the local people as well as managing the programmes which one of it is the Volcano Tour area as the fund source of recovery. The social network also helped to collect financial resources. The community participation is shown by the willingness of people to work together in the preparation and management of the tourism area. These factors are important because it can be a good foundation to create community resilience for the future disasters.

Nonetheless, there is still missing connection between the community self-help recovery and the government recovery that remains a challenge for community resilience. This study recommends that active collaboration and mediation between local government and community leader would result to enhancement on achieving sustainability. This achievement will be important in increasing the community resilience by contributing not only to hazard related factors but also to socio-economic factors that contribute to decreasing the vulnerability of the society.

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