

The Community Resilience in Volcanic Disaster-Prone Area

Napsiah
Dept. Sociology
Sunan Kalijaga State Islamic University
 Yogyakarta, Indonesia.
 napsiah@uin-suka.ac.id

Budhi Gunawan
Graduate School, Faculty of Social and Political Sciences
Padjadjaran University
 Bandung, Indonesia.
 budhi.gunawan@unpad.ac.id

Abstract—This paper aims to describe the efforts of community resilience in the eruption-prone area of Mount Merapi, Yogyakarta Special Region, Indonesia. A qualitative method was employed through interviews and observations to collect the data from participants selected through a snowball sampling technique. The secondary data were also used to support the information needed. The findings of this study suggest that the community attempts to anticipate various disaster risks by building disaster relief houses in which long-standing social relationships have existed among the people, and by intensively cultivating their land such as planting trees. The residents living in the eruption-prone area of Mount Merapi also continuously carry out technical and ecological actions passed down from generation to generation.

Keywords —*resilience, disaster-prone, community*

I. INTRODUCTION

Community-based disaster management has been unquestionably imperative since the communities have experiences in overcoming disasters [1-2] so they can manage themselves, community, and the environment before, during, and after disasters.

By this, the impact of disasters such as poverty and life dependence due to such calamities can be reduced [3]. This is caused by the various disaster risks can be well anticipated earlier [4-5], so that community-based disaster management prioritizing local actions through generations becomes a value system of people living in disaster-prone areas [6-7]. Furthermore, local knowledge can help these indigenous people to easily adapt to the disaster-prone environment and to make them survive [8].

There have been many studies of people surviving in disastrous areas, such as the survivors from the eruption of Mount Merapi [9-14]. Similar studies on floods in Bangladesh have also been deliberately carried out by several researchers [15-17]. Furthermore, the efforts was done by Konyak tribe,

Nagaland, India to deal with floods, storms, landslides, and forest fires [8].

The synthesis of the above research leads to the notion that the community has been consciously understood their living environment as a disaster-prone area, and they have demonstrated great resilience to disasters. They presumably obtain relevant knowledge on how to deal with disasters from the local community, so that every time a disaster occurs, they are able to re-adapt to the disaster risks such as hunger, loss of life, and even life dependence in a post-disaster situation. The above studies also indicate that there is no instruction from the government to permanently evacuate from their residential area because the disaster does not occur every year, so that these settlers return to their homes after the catastrophe is over.

The current study particularly focuses on the actions taken by indigenous community returning to their previously abandoned homes in the disaster-prone area of volcanically active Mount Merapi to describe how their remarkable resilience let them survive the difficult conditions. As reported, many years after the 2010 eruption, these residents had repeatedly survived the unexpected 2016 and 2018 volcanic phenomena, in which the mount released volcanic ash. The rest of this paper will describe the research method, findings, and conclusions.

II. RESEARCH METHOD

The present study employed a qualitative method to examine the resilience of people living in the slopes of Mount Merapi in Yogyakarta Special Region, Indonesia. The snowball sampling technique [19] was used to select the research participants categorized into two:

1. Figures having a close relationship with the community, namely the head of the Sleman Regional Disaster Management Agency, head and secretary of Cangkringan sub-district, head and secretary of Umbulharjo village, and the head of

Pangukrejo hamlet.

2. Local figures such as religious leaders, youth leaders, and village elders.

To collect the data from the informants, interviews and observations were carried out [19]. The observations were carried out through participant and non-participant techniques. They aimed to explore the data that cannot be revealed through interviews. In addition, secondary data obtained from previous research, newspapers, magazines, journals, and local newspapers were used to supplement the data needed in this study.

Both primary and secondary data were analyzed qualitatively. The primary data were gathered through interviews whose results were transcribed. Likewise, information from the observations was used to do the triangulation of the interview results.

The analysis of qualitative data was carried out by referring to an interaction model [20]. This model consists of stages, namely collecting data, reducing data, presenting analyzed data, and drawing conclusions. The study was carried out in Pangukrejo hamlet, which after the eruption of Mount Merapi in 2010, the residents suffered from severe damage, but they were back and built the resettlement.

III. RESULT AND DISCUSSION

A. Resident Harmonization and Mount Merapi

The residents who occupy the slope of Mount Merapi carry out social actions to survive in the eruption-prone area. They have maintained harmonization with the natural environment of Mount Merapi since childhood and have been well-socialized through generations, and this has become a value system for people in Mount Merapi [11,13]. When Mount Merapi erupted, they did not consider eruption as a disaster because it brings benefits for them both economically and socially [10]. The value is passed down through the generations. The value inheritance, will continue if there is an inheritance of traditional social actions. Actions are traditional irrational, because these are carried out continuously in the same way and without considering changes that occur in society [21].

B. Technical Actions

The community ability to know the ecological conditions can be shown by reading natural changes such as fallen trees and leaves, and the release of animals from the forest on Mount Merapi as one of the eruption signs. Also, ecological knowledge of fauna symptoms can be indicated by the people's belief in the behaviors of animals coming out of the forest on Mount Merapi. Similar research in India showed that animals in the wood will come out if

there is a noise and the air temperature increases. This ability is used as an initial mitigation effort so that casualties and losses can be anticipated. They can save some valuables, including livestock, which are kept by relatives or acquaintances living outside the hamlet [8].

Building a house in groups and a fenced house facing the main streets is a technical action by the residents to protect themselves from the material threats of Mount Merapi if it is in an active condition. Thus, the technical experience is used as a way of early mitigation of citizens. A technical experience can be recognized if the residents have experienced disasters and even they are not even willing to leave their homes because they have had the resilience to disasters [8]. This also happens to people living in flood-prone areas; they experience floods every year, but the residents anticipate various losses by building high houses where seeds can be stored so that when a flood happens, they have food security [15].

C. Ecological Awareness

Beside that, the residents of Pangukrejo hamlet have an awareness of ecological actions. The ecological awareness is a condition in which people know that their area is prone to disasters, so they have ways to anticipate disasters by employing a piece of land [8]. For Pangukrejo people, their land is a source of livelihood to build houses and to do economic activities such as raising stock and farming, which are all done on the land. Therefore, even though the land has been devastated by the eruption of Mount Merapi, for them, the land remains useful as a source of livelihood that must be maintained [13, 14].

Since the condition of the land in Pangukrejo is uneven, planting hardwood trees such as durian, bamboo, jackfruit, and *Sengon* (*Albizia chinensis*) is suitable for agriculture. These trees are considered having not only economic value, but also functions to ward off the materials of Mount Merapi. Bamboo trees as an example are considered to have a strong endurance to ward off cold lava flows, so that homes of residents will survive the risk. Likewise, durian, *Sengon*, and jackfruit trees can hold the volcanic ash, so that residents' houses can be protected from them every time an eruption occurs.

The technical and ecological awareness are the form of community resilience to survive in disaster-prone areas [8]. Resilience is developed based on their long-standing experience, so that if the community knowledge is not included in the disaster management, there is a tendency for the residents to reject the government's programs offered to them, on the grounds that they have experiences in managing disasters even they have the resilience for before, during, even after a disaster occurs.

IV. CONCLUSIONS

The disaster management carried out by the local living in disaster-prone areas has become a part of their life. As the efforts to anticipate the various disaster risks, they carry out technical actions and ecological actions, i.e., building disaster relief houses in which they keep the long-standing social relationship and utilizing land by planting hard trees. The technical and ecological actions are conducted from generation to generation, so that they become a traditional resilience action of the residents living in eruption-prone areas of Mount Merapi.

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