



Original research article

Resilience of The Sumberwuluh Village Community in Facing Semeru Disaster

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ABSTRACT

Mount Semeru eruption in December 2021 caused fatalities, injuries, as well as housing and economic losses for the people of Sumberwuluh Village, Lumajang, East Java, Indonesia. As one of the areas through which the Mount Semeru river basin passes, cold lava floods are an annual disaster in Sumberwuluh when the rainy season comes. This research was done through direct field observations and interviews, supported by secondary data sources in the form of literature, to examine the Sumberwuluh community's resiliency in disasters, emphasizing the economic and social aspects. The research findings suggest that the Sumberwuluh people successfully adapted to economic changes and developed social cooperation to survive. Economic resilience involves changing livelihoods to become sand and stone miners, as well as efforts to find alternative sources of income. On the other hand, social resilience includes coordination and cooperation between residents and forming groups as a preventive measure against disasters. This resiliency is built through the community's collective efforts to overcome the economic crisis and face the disaster threat.

1. Introduction

Mount Semeru eruption on December 4, 2021, caused considerable damage and losses which affected the surrounding community. The impact of the Mount Semeru eruption resulted in approximately 2,417.2 ha of land being damaged, including forests, open land, agricultural land and plantations, and residential areas. Based on the disaster map released by the Indonesia Geospatial Information Agency (Badan Informasi Geospasial; BIG), shows the direction of the eruption flow of Mount Semeru which is towards the South and Southeast regions, namely Candipuro District and Pronojiwo District. This caused these two sub-districts to experience the worst damage both materially and financially, especially for the agricultural and plantation sectors.

The eruption of Mount Semeru on December 1, 2021, shocked the wider community, especially people who live in the Supiturang Village in Pronojiwo District and Sumberwuluh Village in Candipuro District. The fall of hot clouds was quite large and resulted in volcanic ash rain accompanied by rain, which caused floods of cold lava, the vomiting of hot lava material from Semeru on a scale so large that it reached millions of cubic meters, making the Besuk Kobok'an river full of hot lava and even filling up several heavy equipment and sand-transporting trucks.

In Sumberwuluh Village itself, during the cold lava flood disaster, people fled to evacuation posts because the cold lava flood eroded two flood prevention embankments until they overflowed. The Semeru cold lava flood also caused an access bridge for the Jobong community in the Kebondeli Selatan hamlet to break down due to flooding, leaving Jobong residents isolated.

The Semeru cold lava flood is a disaster that always haunts the people of Sumberwuluh Village. But on the other hand, there are blessings that people can take advantage of. How could it not be? The cold Semeru lava flood, which carried millions of cubic meters of sand material, made their land filled with sand.

The term resilience was first introduced in the 1950s under the name ego-resiliency (ER), which is a general ability that involves the ability to adapt highly and flexibly when faced with internal and external pressure. Initially, the concept was applied to children, known as "invulnerability" or "stress resistance." ER and resilience are both treated as protective factors against adversity, differing in many ways [1].

Resilience is a person's ability to overcome, go through, and return to their original condition after experiencing stressful events [2]. Resilience comes from the Latin word "resilire" which means to rise again [3]. Several factors influence

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resilience. According to Reivich and Shatté [2], resilience is formed from seven aspects of a person:

- a. *Emotion Regulation* is a person's ability to remain calm and in control even under stressful conditions. In other words, the extent to which we can control emotions, especially negative emotions when we are experiencing failure.
- b. *Impulse Control (Self-control)* Individuals who have a high impulse control factor will find it easier to regulate emotions. Our ability to regulate our impulses is important to ensure that every behaviour we carry out is still under our control and does not get out of control.
- c. *Optimism* is self-confidence that everything will change for the better, having hope for the future, and believing that we can control the kind of life we want.
- d. *Causal Analysis (Problem Cause Analysis)* is the ability to identify the causes of an event experienced. This is important to protect ourselves from taking wrong actions and harming ourselves or others.
- e. *Empathy (Empathy)* is the ability to feel or identify oneself in the same circumstances, feelings or thoughts as another person or other group. Empathy helps us to be sensitive to other people's feelings and reduces the risk of conflict.
- f. *Self-Efficacy (Self-Efficacy)* describes a belief that an individual can solve problems and achieve success. With this belief, we become motivated to solve problems and believe that the problems we face can be overcome.
- g. *Reaching out* (ability to achieve what one wants) Individuals who can improve and achieve their intended desires will have a more positive aspect. If we are afraid of failure before trying, we will not get what we want.

These seven aspects are very important for those who want to become resilient when facing life's challenges. To form it, people need practice to get used to developing a resilient mindset. Based on the definitions above, it can be concluded that resilience is an individual's ability to recover from stressful situations and adapt and survive in the face of these conditions.

Desa Tangguh Bencana as known as Destana (Disaster Resilient Villages) are programs that have the independent ability to adapt and face the threat of disasters, as well as recover quickly from the detrimental impacts of disasters [4]. In its development, Destana has several specific objectives, namely reducing the impact of losses on the community, increasing the role of the community, increasing institutional and government capacity, and increasing stakeholder cooperative relations in Disaster Risk Reduction. This research was conducted to find a picture of community resilience after the Mount Semeru overflow disaster in Sumberwuluh through two aspects of review, namely the economic and social aspects of the community.

2. Method

The research method used is descriptive qualitative with a cross-sectional study approach. Cross-sectional research is research conducted only at one specific point in time. This research can describe the relationship between one variable and another through observation, model testing, or hypotheses. Cross-sectional research is considered unable to explain the dynamics of transformation involving time as an

aspect of observation. Cross-sectional research methods are also not used to see the correlational relationship between a variable, its process, or the causal relationship between the two research variables [5]. Cross-sectional research can be used to explain the realm of discussion of the "product" of a study. The research process or mechanism with the actual product can be explained. However, the dimensions of discussion of mechanisms and processes are considered narrower because their sustainability is only reviewed over a period of time [6]. This research can describe research in an exploratory, descriptive, and explanatory way.

According to Sugiyono [7], the qualitative descriptive method is a research method based on the philosophy of postpositivism, which is used to research the conditions of natural objects (as opposed to experiments), where the researcher is the key instrument. Data collection techniques are carried out by triangulation (combination), data analysis is inductive/qualitative, and the results of qualitative research emphasize meaning rather than generalization. Qualitative descriptive research aims to describe, depict, explain, explain, and answer in more detail the problems to be studied by studying an individual, a group, or an event as closely as possible.

Research data was collected through direct field observations supported by secondary data sources in the form of literature. Researchers aim to reveal the resilience status of the Sumberwuluh community as a form of adaptation to the Mount Semeru disaster.

3. Results and Discussion

The research findings illustrate the resilience capabilities of the Sumberwuluh community towards the Mount Semeru disaster. Resilience is closely related to economic and social aspects, which are fundamental elements of the survival of the Sumberwuluh community. This research was conducted using interview and observation techniques to get a picture of the community's social and economic resilience, supported by secondary data in the form of a literature review.

The community's ability to develop resilience components from economic and social aspects can indicate post-disaster recovery. Every individual is considered capable of rising from times of difficulty. This is characterized by their ability to gradually re-arrange what was previously destroyed to become whole again. The difficulties faced and experienced, especially during times of crisis, are used as lessons so that we can anticipate them better if disaster occurs again. The resilience level of a Destana is also considered to influence the resilience level of the affected community.

3.1. Economy

Before the cold lava eruption of Mount Semeru in 2021, the majority of the people worked as farmers, as depicted in [Figure 1](#). However, conditions experienced many changes in all aspects of people's lives after the disaster, especially the occupational aspects, which form the framework for the economy. The community's main income, originally from the plantation and agricultural sectors, has shifted to the sand and stone mining sector by utilizing the volcanic materials of Mount Semeru.

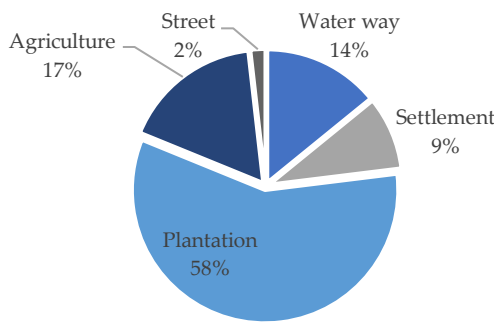


Figure 1. Occupation of Sumberwuluh community before Mount Semeru eruption in 2021

The community's change of occupation was based on the destruction of their plantation and agricultural land due to the overflowing cold lava floods. Their land, which was initially used as their primary source of livelihood, was forced to retire because it could no longer be used. The change of land cover from 2021 to 2022 can be seen in Figure 2.

In their efforts, the people of Sumberwuluh carry out various economic activities to find alternative sources of livelihood. Some people ultimately choose to become sand miners as a form of survival. Apart from being miners, some people also decided to become entrepreneurs by opening food stalls in mining areas. In contrast, people who still had land not affected by Mount Semeru's eruption chose to continue using their land as a place for gardening.

Disasters may negatively impact people's well-being and potentially disrupt individuals' and broader communities' established roles and routines [9]-[11]. Occupational disruption is an interruption to an individual's occupational engagement, which can be alleviated by re-engagement in purposeful and meaningful occupations [12]. In disaster recovery, rather than relying on restoration, adaptation to everyday life may be required in order to recover. Adaptation

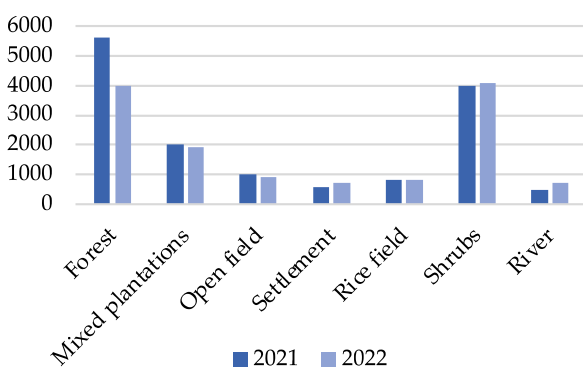


Figure 2. Changes in land cover in Candipuro District (redrawn from [8]).

may be a significant aspect of poverty reduction [13] and a coping or survival strategy [14]. After all, people will continuously "do something" in response to ongoing challenges [15].

This occupation shift demonstrates the Sumberwuluh people's resilience in the economic aspect. As Levin [16] mentions, resilient communities can learn from disturbance and stress and find opportunities for renewal. In this stage of the recovery process, people managed to forge new meanings within their occupational routines and thus establish a new sense of normality. It should be noted that this did not necessarily entail the abandonment of the old memories and meanings associated with the prior condition. Instead, those individuals who had arrived at a 'new normal' managed to maintain a sense of enduring connectedness to the village they loved while developing new meanings in their lives post-disaster [17].

3.2. Social

The resilience of the Sumberwuluh community, reflected in their ability to survive, highlights the collaboration between residents as an effort to support each other in facing disasters. Over time, society has formulated a way of life that involves forming groups to notify each other when a disaster has struck or provide disaster warnings as a preventive measure. More than that, the spirit of community cooperation is also manifested in the practice of mutual cooperation, such as involving themselves in shifts to guard the portals, which aims to strengthen the security and vigilance system in their village environment.

In assessing the Sumberwuluh community's resiliency to disaster, we use the Resilience Index formula from the National Agency for Disaster Countermeasure (Badan Nasional Penanggulangan Bencana /BNPB) [18]. The index considers five components in its assessment: 1) quality and access to basic services, 2) availability of disaster management regulations and policies, 3) implementation of prevention and mitigation efforts for disaster, 4) emergency preparedness, and 5) recovery preparedness. The results of the assessment are provided in Table 1.

Based on the assessment of the disaster resilience of Sumberwuluh Village, satisfactory results were obtained regarding disaster management regulations and policies, with relatively low points in recovery preparedness. The findings indicate that less attention is allocated to the impacts caused after a disaster. The government prioritizes providing basic services and strengthening disaster management regulations and policies that apply to society. Increasing disaster preparedness continues to be encouraged, but important aspects related to recovery have yet to reach the average target.

Table 1. Assessment of disaster resilience in Sumberwuluh Village

No	Component	Component index	Resilience index	Toughness level
1	Basic services	0.69	58.14	Tangguh Pratama*
2	Disaster management regulations and policies	0.75		
3	Prevention and mitigation	0.40		
4	Emergency preparedness	0.57		
5	Recovery preparedness	0.30		

*is the first level of 3 levels: *Pratama* (beginner), *Madya* (intermediate), *Utama* (advanced).

In the meantime, Destana's role in building resilience efforts is focused primarily on enhancing the community's capacity for disasters. Community capacity includes mitigation efforts, disaster preparedness, and survival capabilities. In terms of time, Destana's preparedness covers the pre-disaster process, and during the disaster, it has yet to cover the post-disaster recovery process. Overall, Sumberwuluh's resilience index is at the beginner level (*Tanggung Pratama*) and requires further improvement to reach a higher index for better preparedness for disaster.

The increasing level of preparedness is a community-led endeavor and arises naturally over time. This was motivated by the instinct to survive. All interrelated social aspects also contribute to increasing the social resilience value of the Sumberwuluh community, creating an environment that is resilient and ready to face various challenges that may arise in the future.

4. Conclusion

The level of community resilience to the Mount Semeru eruption disaster in Sumberwuluh Village consists of social and economic aspects. The Mount Semeru eruption disaster in December 2021 caused significant impacts, especially around the mountain. Hot clouds, volcanic ash, and cold lava floods caused damage to infrastructure, isolated several areas, and affected the economic and social life of the community. Apart from the suffering, this disaster also provided economic blessings for some communities, especially sand miners who received abundant supplies due to the cold Semeru lava.

The people of Sumberwuluh, who were able to recover after being economically affected, showed a high level of resilience. They adapted quickly, changing their livelihood to become sand miners, opening new businesses, and remaining united in the face of difficulties. The social aspect is also seen through cooperation in providing early warnings and working together to maintain environmental security. Destana plays a critical role in boosting community preparedness for the Mount Semeru disaster. However, based on the Resilience Index, Sumberwuluh is just at the beginner level (*Tanggung Pratama*). Thus, further improvements are required to better prepare the community for the disaster. Future research is needed to provide applicable solutions for enhancing the resilience of Sumberwuluh Village.

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Author Declaration

Authors' contributions and responsibilities

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

Additional information

No additional information from the authors.

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