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REVIEW HOUSE COMMUNITIES VULNERABLE TO VOLCANIC DISASTER

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Abstract - Mount Merapi, the most active volcano in Indonesia, the shortest eruption intensity is 2 years and the longest is 7 years, causing a high level of disaster risk in the vicinity, because many people still choose and deliberately live in the area around Mount Merapi. The research is expected to formulate housing for disaster-prone communities. This study will later serve as a basis or limited to developing an alternative residential house, meaning that this research does not find and examine ideal residential houses according to community characteristics. The review process conducts and analyzes primary data, where our intellectual understanding is built on logical argumentation abilities, not built on empirical experience, which depart from grand-concepts, which may already be grand theories, not yet presenting grand theories, but are still big concepts. Based on the results of the analysis, this study can propose alternative housing for volcano-prone communities as an effort to build self-resilience in dealing with disaster risk.

Keywords: community resilience, residential houses, folding houses.

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INTRODUCTION

Indonesia is one of the countries crossed by the ring line of volcanoes in the world. One of them is Mount Merapi, Mount Merapi is geographically located at 7° 32.5' South Latitude and 110° 26.5' East Longitude, and administratively it is located in 4 (four) districts namely Sleman Regency in Yogyakarta Province and Magelang Regency, Boyolali Regency and Klaten Regency in Central Java Province.

Mount Merapi Has a height reaching 2,980 meters above sea level. The eruption and eruption of Mount Merapi can cause considerable damage and loss to the surrounding area, namely human casualties, suffering, loss of damage to environmental facilities and infrastructure and cause disruption to the life system and livelihoods of the people on the slopes of Merapi. The series of events caused by the eruption of Mount Merapi and the losses and damage they caused did not necessarily make the people living there fearful and move to a safer place, or look for a place to live far from disaster-prone areas.

As for the historical review of the physical building of residential houses in confectionery after the eruption of Mount Merapi 2010, among others:

a. Self-Construction of Post-Eruption Houses

The community in general has sufficient resilience to quickly recover and continue their lives after a disaster occurs, including building houses independently, in general, these are residents who previously have sufficient economic levels and have savings.



Figure 1. Independent House Construction

Source: (Ikhwanuddin, 2014)

b. Development By Government Institutions

Apart from carrying out the development independently, some residents also receive assistance from the government and non-governmental organizations which provide assistance during the rehabilitation process. Location what is directed is a place that is far away and safe from the threat of future eruptions of Mount Merapi, generally the location used is apart from land acquisition purchased by the government, also using village treasury land that meets security requirements from disaster threats.



Figure 2. Huntap development
Source: (Ikhwanuddin, 2014)

Research Objectives, the purpose of this research is to examine the residential houses of disaster-prone community's volcano. Definition of Disaster, disaster is an event or series of events that threatens and disrupts people's lives and livelihoods, which are caused either by natural factors and/or non-natural factors as well as human factors resulting in human casualties, environmental damage, loss of property, and psychological impacts. Related to disasters, there are several things that can lead to disasters, including: a. Hazard, hazard is a natural or man-made phenomenon that the potential to threaten human life, property loss and environmental damage. b. Vulnerability, vulnerability (vulnerability) is a condition of a community or society that leads to or causes an inability to face the threat of danger (Bakornas PB, 2007). The level of vulnerability can be viewed from several aspects: physical (infrastructure) vulnerability, social vulnerability, economic vulnerability, and environmental vulnerability. c. Disaster risk, disaster risk (Bakornas PB, Edition II Year 2007) is the potential loss caused by a disaster in an area and a certain period of time which can be in the form of death, injury, illness, life threatened, loss of sense of security, displacement, damage or loss of property, and disruption of community activities. In general, disaster risk can be formulated as follows :

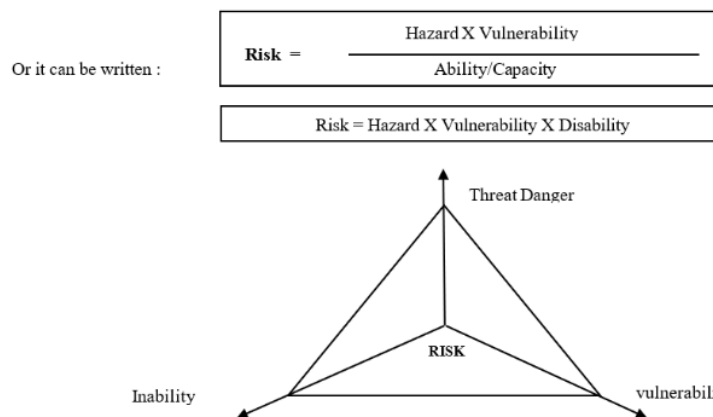


Figure 3. The concept of disaster risk
Source: BAKORNAS PB, Introduction to Disaster Characteristics and Their Mitigation Efforts in Indonesia

- From the disaster risk concept image above, it can be interpreted that:
- Hazard, indicating the possibility of natural and man-made disasters occurring in an area place.
 - Vulnerability, showing the vulnerability faced by a community in dealing with the threat.
 - Disability, is a scarcity of efforts or activities that can reduce casualties or damage.
- As an illustration, it is as arranged in the disaster risk matrix below:

VULNERABILITY	HIGH			
	MEDIUM			
	LOW			
		LOW	MEDIUM	HIGH
DANGER				

Figure 4. Disaster Risk Matrix

Source: BAKORNAS PB, Introduction to Disaster Characteristics and Their Mitigation Efforts in Indonesia

Twigg, (2007), resilience is generally seen as a broader concept than capacity, because resilience concept is higher than mere behavior, certain risk reduction and management strategies and measures commonly understood as capacities. However, it is difficult to separate these concepts clearly.

Furthermore, Twigg (2007) said that in everyday use, capacity and endurance often have the same meaning as resilience. A focus on resilience means placing greater emphasis on what people can do for themselves and on ways to strengthen their capacities. With this approach, the system or community defense in Twigg (2007) can be understood, among others:

- The capacity to absorb pressure or crushing forces, through resistance or adaptation.
- The capacity to manage or maintain certain basic structures and functions during catastrophic events.
- The capacity to recover or bounce back after an event.

Community is the main and foremost component in disaster management efforts, for that community involvement in disaster risk reduction activities is very important.

- Role of the Community.** The current paradigm for disaster risk reduction is a plan that involves various sectors and cross- regions covering social, economic and environmental aspects. Where is society become the subject as well as the main object and target in efforts to reduce disaster risk by incorporating and paying attention to local wisdom and traditional knowledge that exists and develops in society.
- Community Rights and Obligations.** So far, people are often placed as victims who must immediately get help in the form of assistance and emergencies and have limited participation in disaster management efforts, especially at the mitigation stage. So with Articles 26 and 27 paragraph 1 of Law no. 24 of 2007, can provide sufficient space for the community to be involved and actively participate in disaster management efforts. Community involvement in disaster management is a right (role) and at the same time an obligation in reducing disaster risks that occur in their environment.
- Managing Community Participation**
Bryant and White (1987), participation is an attitude of openness to the perceptions and feelings of other parties, participation means deep concern about the differences or changes that a project will produce in relation to people's lives, participation is an awareness of the contributions that can be given by other parties for an activity.

More about community empowerment when viewed from the rural level. Usman, (2004), rural development is a process that seeks to strengthen what is commonly called community self-reliance or independence. In this process the community is assisted, assisted and facilitated to carry out an analysis of the problems they face, to find solutions to these problems by using the resources they have, creating activities with their own abilities. In this approach, the community is given the opportunity to decide what they want, and their initiative then becomes the basis for their regional development programs. Experience of Community-Based Disaster Management for the 2010 Merapi Eruption (Ikhwanuddin, 2014)

- Evacuation Process and Emergency Response Handling.** During the 2010 eruption of Mount Merapi, we will be directed to the heroic stories of residents, volunteers and the awareness of the people themselves who immediately fled or went down to the shelters provided, both assistance from the government and non-governmental organizations, the evacuation process was also carried out independently by residents.
- Infrastructure and Placement of Merapi Refugees.** Temporary shelters, to accommodate evacuees during the eruption of Mount Merapi, were mostly placed in temporary shelter locations, such as open spaces and built tents, government

- buildings, sports buildings, and other schools. Shelters, the other best thing the community has done is their willingness to occupy shelters as temporary housing during the rehabilitation and reconstruction process.
- c. Description of Community Participation in the Rehabilitation and Reconstruction Program, The community has a significant role in the success of all rehabilitation and reconstruction programs in the area after the Merapi eruption disaster. One of the community's participations is that the community is the key to success in managing disaster response areas: - The role of the community in the Settlement Arrangement Plan (RPP), the community has the ability to carry out planning, strategies to increase capacity in utilizing the potential and problems that exist in their area independently.



Figure 5. Potential and Problem Mapping
Source: Survey 28 September 2011 (Ikhwanuddin 2014)

The process of making a regional site plan, a form of community participation, is the creation of an area site plan as a forum for accommodating aspirations and input from the community in the success of the rehabilitation and reconstruction program.



Figure 5. Development of the Batur Relocation Site Plan, Kepuharjo Cangkringan
Source: Re-Kompak (Ikhwanuddin, 2014)

RESEARCH METHODS

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The method used in this research is qualitative rationalistic, in which all knowledge comes from our intellectual understanding which is built on logical argumentation abilities, not built on empirical experience, which departs from grand- concepts, which may already be grand theory, but are also rejected. The possibilities don't feature a grand theory yet, but it's still a big concept. This means that the method used in this research is based on the process of observation and study through literature studies of primary data that researchers obtain from examples of cases related to volcanoes.

The main things to do in the research preparation stage are research instruments and research materials. For the main research instrument is the involvement of researchers in starting writing so that before carrying out the study process, researchers need to equip themselves with an understanding of concepts, theories and broad insights on the topics studied. Here researchers need literature studies, including study literature, scientific journals, to serve as a theoretical basis for research and to support the implementation of this research, either in the form of government policies, regulations and guidelines related to disaster preparedness and management as well as articles relevant to the objectives. In this research, docum²⁵ will be collected to be used as a basis and tool as well as supporting the research process.

Data analysis is carried out based on specific data from the results of studies and reviews from several sources. After the study was carried out, then increasing understanding of the cases studied by trying to find and analyze data and information obtained from the study literature, then proceed with compiling the concept of a residential house based on the unit of analysis.

RESULTS AND DISCUSSIONS

It is based on that the tug of war between the government and the community regarding orders to relocate, where the government hopes that this relocation will provide a good solution for the community in the future, not to experience even bigger disasters due to the eruption of Merapi and on the other hand the desire of some people to survive with realistic reasons.

In this research, for the people who live in the area around Merapi, the community's efforts to build their resilience can be seen from the way they manage and develop the vulnerable elements in their area. Furthermore, to develop and improve their abilities or capacities, the community needs self-commitment, the community and support from government and non-government institutions as well as physical support from the area where they live. Support from the community itself is how the community responds to the things they have to do to make it easier for them to develop their abilities and increase their capacity to achieve self-resilience and that of other communities.

So as the main alternative in writing this research is how to design or create a residence that can be made mobile, meaning a residence that can be moved moving, if a disaster occurs, this is useful for residents because they will not experience greater losses, both during and after a disaster occurs. As stated in the previous discussion, that volcanic natural disasters have differences from other natural disaster events. Where a volcanic eruption has several stages or levels until a peak eruption occurs, for this reason it is the main basis for this research to utilize the phases or levels of this disaster event to provide alternatives/proposals for the design of houses for people prone to volcanic disasters, especially for people living around the volcano. merapi.

The main focus in the discussion in this section is to design houses for this disaster-prone community, which have a flexible concept and are a series unit that integrates each part in it, which can be folded and mo³⁰ easily. The design and proposal for this Mount Merapi disaster-prone house will provide great benefits for people who live in disaster-prone areas, because the existence of this folding house will make it easier for people to disassemble and assemble if a disaster occurs at any time, without the need to carry out construction (high costs). home returns when returning to the place of origin.

Illustration of Folding House Construction. In this sub-section, the researcher tries to give an overview of what is meant by a residential house for a community prone to Mount Merapi disaster, but we need to limit that the results of this study are not an ideal residential design that must be owned by a community in a disaster-prone area of Mount Merapi. . We emphasize in this design that people living in disaster-prone areas should have early preparedness and resilience, especially in terms of physical resilience, namely residential houses.

As discussed in the literature review section regarding the building system, the main things that need to be considered in this research are (1). Performance Provisions, including structural suitability, integration and security, Resilience, (prevention and safety against fire), Thickness of building construction, Control of airflow and heat flow, Control of migration and condensation of water vapor, Movement of buildings due to land subsidence, structural deflection and others. (2). Aesthetic Quality, including the linkages to be created between the building and the site, the surrounding buildings and the environment as well as the desired quality of shape, mass, color, pattern, texture and detail (3). Regulatory Limitations, Compliance with land use zone regulations and building code regulations. (4). Economic considerations, including initial costs including materials, transportation, equipment and workers as well as utilization costs or life cycle costs, not only covering initial costs but also maintenance costs, energy consumption, length of use, replacement costs, and interest on the investment of this building. (5). Environmental Impact, including energy and resource conservation through placement and building design, energy efficiency

of mechanical systems and efficient use of resources and use of non-toxic or hazardous materials. (6). Construction Practices, including safety provisions, permissible tolerances and measurements, compliance with industry and insurance standards, construction time required, preparation for bad weather and others.

Before discussing the stages of using a folding house, the main point that we can underline is that in the future this illustration of the construction of a folding house can be proposed to be a residential house for people prone to volcanic disasters, especially in the area of Mount Merapi. We can explain that this folding house will be temporarily moved to avoid the impact of the eruption of Mount Merapi, and placed in a safer location according to the zone set by the government. Why is it called a temporary move, because later this folding house can be reassembled to its original place when the situation is safe.

Because this research is only limited to proposals, ideal conditions and structural and construction calculations are still being eliminated. It is hoped that there will be further research to find and formulate the ideal house that must be owned by people who live in disaster-prone areas.

CONCLUSIONS

Conclusion, the conclusions that can be generated in this study are Community capabilities and strategies in building self-resilience against threats Mount Merapi eruption. The community has a high social level, this is evidenced by togetherness and volunteerism they are facing a disaster. In building resilience, the community is greatly helped by the support from institutions government and non-government. This Folding House is the right alternative to increase community resilience who live in disaster-prone areas

Suggestions, Community empowerment must pay attention to differences in community groups, levels the vulnerability of each region. Build infrastructure with innovation and technology that is resistant to eruptions so that the investment value built is not in vain. It is necessary to carry out more in-depth research regarding this folding house alternative which is adjusted to the characteristics of the region. This Study of Residential Houses for Mount Merapi Disaster-Prone Communities in general can be applied and used as a reference for other volcanic cases in Indonesia.

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