Achieving Sustainable Development through The Concept of Community Resilience in Post-Disaster Recovery
Case Study : Cihamerang Village, Sukabumi Regency

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ABSTRACT

Indonesia is a country with a high intensity of natural disasters such as earthquake, tsunami, volcanic eruption, land movement, flood, and so forth. This disaster-prone condition in Indonesia demands disaster management capability to reduce the risk through mitigation, response and recovery programs and policies. In the context of sustainable city development, post-disaster recovery play a big role as the long-term phase which turns disasters into opportunities for sustainable development, to reach "build back better" concept. Post-disaster recovery not only focus on how to restore the place to the condition before disaster occurred, but to respond the future challenges and problems related to disaster. This study uses the concept of community resilience assessment in post-disaster recovery as a framework for understanding how to achieve sustainable development. The research took place in Sukabumi Regency, which was a 6,3 SR earthquake on January 23rd 2018, precisely in Cihamerang Village as the most affected village by said earthquake. This study adopts community knowledge concerning aspects of a disaster, community response to a disaster and local wisdom applied in the community as the form of adaptive resilience which affect the post-disaster recovery process. This study shows that the community resilience in Desa Cihamerang is in moderate grade with local wisdom potential as effective instrument to strengthen resilience in achieving sustainable development after disaster through post-disaster recovery process.

Keywords : Community Resilience, Post-disaster Recovery, Local Wisdom, Sustainable Development

1. INTRODUCTION

Based on data released by the United Nations Agency for the International Strategy for Disaster Risk Reduction (UNISDR 2009), Indonesia is in the category of countries with the greatest natural disaster risk, with around 5% of the area exposed and 15% of the total population threatened with multiple hazard (Groen 2012). Based on International disaster-prone map, Indonesia occupies the highest position for tsunami hazards, landslides and volcanic eruptions. As for the earthquake disaster, Indonesia is in third place prone to international earthquake disasters (BBC 2011). Indonesia's condition is prone to disasters, demanding high disaster management capabilities.

According to Indonesia Government Regulation Number 21 of 2008 concerning Implementation of Disaster Management, natural disaster management itself is divided into stages, which are before, during and after a disaster. Post-disaster recovery becomes a very important process because it is a stage that requires a long period of time. Post-disaster recovery can be interpreted as an effort to minimize and rehabilitate damage caused by various impacts caused by post-disaster, including the economic impacts of disasters, and overcome physical, social and cultural problems that arise afterwards, and when disasters occur (Coffey, Sagala and Wulandari 2017). Post-disaster recovery is an important aspect in the concept of build-back-better. This concept illustrates that The use of recovery, rehabilitation and reconstruction phases after a disaster to increase knowledge of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and social systems, and into the revitalization of livelihoods, economies, and the environment (UNISDR 2017).

Build back better itself is a concept developed by UNISDR in 2017 with the aim of post-disaster recovery to achieve sustainable development. One factor that is considered to have a significant influence in the post-disaster recovery process is the ability of the community to support post-disaster recovery (Cutter 2010); FEMA 2011; Olshansky, Hopkins and Johnson 2012; Folke 2006). The ability of the community to support post-disaster recovery can also be called Community Resilience. One understanding of Community Resilience is the capacity to recover or "bounce back" after an event (Twigg 2007). The relationship between community resilience and sustainable development can be described through 4 relationships. (1) Resilience is necessary and sufficient for sustainable development (2) Resilience is sufficient, but not necessary for sustainable development (3) Resilience is necessary for sustainable development (4) Resilience is neither necessary nor sufficient for sustainable development depends on the conditions of each region (Derissen, Quaas and Baumgartner 2011).

The role of community resilience in post-disaster recovery can be seen through the Yogyakarta case study. Based on the data obtained, the Province of Yogyakarta can rise again within a period of 2 years (Kusuma 2016) with an increase in economic growth of 2% (BPS 2016). Community resilience in Yogyakarta is considered to support the post-disaster recovery process efficiently (Idhom 2012). In addition, there is also a "Jogja Grumegah" or "Jogja Bangkit movement" where the people of Yogyakarta work together to build their homes damaged by the earthquake (Kusuma 2016).

Related to this concept, the authors study on how community resilience can affect the condition of post-disaster recovery. The author took the case that occurred in Sukabumi Regency with the 6.3 magnitude earthquake that occurred on January 23, 2018. According to the Head of the West Java Provincial Disaster Management Agency (2018), Sukabumi Regency was the area most affected by The Banten earthquake because of its location which close to the epicenter of the earthquake. Based on the validated report in March 2018, losses due to the earthquake disaster reached 21 billion rupiahs with 8061 units of house damage spread across 33 sub-districts from 47 districts with 2,395 houses severely damaged, 1,999 units was medium damage and 3,667 units was lightly damaged. Meanwhile, the most affected area is Cihamerang Village in Kabandungan District. This is because the village is located in line with the epicenter of the Banten earthquake.

Studies related to planning and development in post-disaster recovery have become one of the specific topics in the planning literature, including a review of programs, policies and conditions that have been widely adapted to the needs of post-disaster recovery planning (Schwab 2014). However, the condition of the level of vulnerability and resilience of communities in each region is a major contributor that can affect planning conditions (Schwab 2014). This study contributes to an understanding of how post-disaster recovery are affected by the resilience of the Cihamerang Village community to be better prepared for the next disaster. Community resilience in planning the recovery of a post-disaster area plays a role in determining how communities independently, complexly and adaptively able to make decisions, oversee the process and provide input and become the main actors in the development of post-disaster areas (Cutter 2010).

By making a good post-disaster recovery plan, the recovery process can become an investment in rebuilding an area, not only to restore the function of the region as usual, but also to improve the economy and resilience of an area in the face of further disasters which lead to sustainable development. The study of community resilience is important as a basis for the analysis of the formation of regional development plans in a sustainable post-disaster recovery effort (Olshansky, Hopkins and Johnson 2012). For this reason, this study aims to find out how the resilience of the community in Cihamerang Village is by knowing the level of knowledge, response and local wisdom of the community in supporting post-disaster recovery. This study is also important because the results of the study can be used as input for the government and planners in regulating

program and policy needs in planning regional recovery, especially in Cihamerang Village, Sukabumi Regency.

In the initial section, this paper describes the occurrence of earthquakes that occurred in the Cihamerang Village, Sukabumi Regency and the post-earthquake conditions including a description of the general social and cultural conditions of the community. The next section describes the literature review from various previous studies, and other related documents. In the third section, adjust the location and methodology of the study used to answer the study objectives. The fourth part is an explanation of the findings of the study and analysis of the results of research conducted relating to community resilience in the recovery after the earthquake disaster. In the final section, the article contains conclusions and recommendations from the study results that can be used as input for further research related to community resilience in post-disaster recovery.

This study uses the drop model concept. DROP Model developed by Cutter (Cutter, Barnes, et al. 2008), illustrates that vulnerability and resilience are interrelated concepts. The scale of the units used in the DROP Model are individuals or households in an area or aggregate of the unit. Based on this, the DROP model explains that there are initial conditions (conditions before a disaster occurs) that are influenced by aspects of Natural System, Social System, and Built Environment which are slices of vulnerability and resilience. These initial conditions will then meet with disaster events with certain characters that have frequency, intensity, magnitude or other variants based on the type of disaster that occurred in the location of the study area. The encounter between the initial conditions and the occurrence of a disaster will have an effect, where the effect will be affected by the preparedness of the response such as evacuation plans and shelter preparation as well as the distribution of information about disasters. These conditions will produce an impact or what is referred to as Disaster Impact as measured by damage and losses that occur in the affected location. Based on the DROP model, the degree of recovery as it will going fast or slow is determined based on how adaptive resilience can respond to the impact of the disaster. Of course this model forms a cycle where after a disaster event the community should have better preparedness in the face of subsequent disasters. The advantage of this model is that it can provide an overview of disaster events in an area by using indicators that can be measured. this model can explain simply the complexity of disaster events and the relationship between resilience and vulnerability.
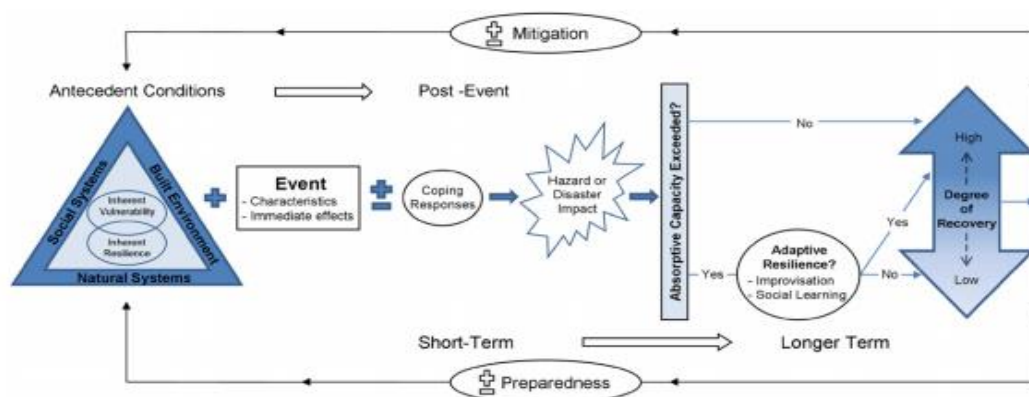
Sourcer : A place-based model for understanding community resilience to natural disasters, 2008
Figure 1. Relationship of Community Resilience toward Disaster Recovery Scheme

2. METHOD

To understand community resilience in recovery after the earthquake disaster in Cihamerang Village, Sukabumi Regency, this study used an ethnographic approach using a micro approach in

the form of interviews, questionnaires, and observations, then the results of the information obtained were combined with information sources derived from literature review and related documents to make a perfect results of analysis.

Data Obtaining

Interviews, questionnaires and observations were conducted in March 2018. Questionnaires were conducted to obtain information related to knowledge, response and public perception as a benchmark for assessing community resilience on a household scale, with a sample of 96 households. The questionnaire was taken by stratified random sampling method by taking a sample of 1 household within 20 houses in 1 neighborhood association.

Interviews were conducted with an open question method to find out in depth about relevant information in explaining the assessment of community resilience in Cihamerang Village. The interviews were carried out by considering stakeholders who contributed directly to the recovery process after the earthquake disaster such as Disaster Management Agency for the Rehabilitation and Reconstruction section, the Social Service for Disaster Emergency Management, the District Office for Peace and Public Order and the Village Head to find out about disaster management program of each region and how is community participation towards recovery process. Communities and stakeholders such as the Village Head were also interviewed to find out how the community views on disasters and the implementation of reconstruction.

Observations are carried out to strengthen the relevance of conditions with the results of the analysis to be found. Meanwhile, the things that will be investigated are the physical condition of the building and infrastructure, the characteristics and and potency of the area and the location and condition of temporary shelter post disaster. Whereas for secondary data is used to strengthen the results of the analysis by using spatial information from BAPPEDA.

The location chosen in this study is Cihamerang Village, Kabandungan District. Sukabumi Regency is the area most affected by the Banten earthquake. Cihamerang village was damaged by 362 houses with 271 houses severely damaged and suffered a loss of 3.7 billion
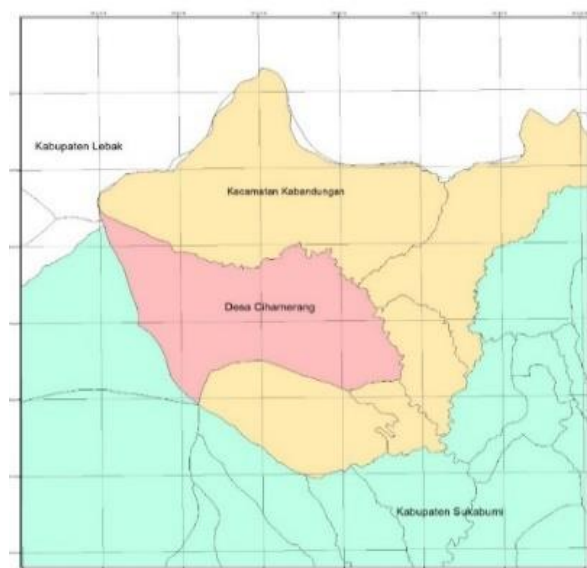
Source : Based on ArcGis Analysis, 2018.
Figure 2. Administration Maps of Cihamerang Village

Data Analysis

All forms of information obtained will be translated into scores on a scale of 0-1 according to DROP Model benchmarking in measuring community resilience that influences post-disaster recovery, namely adaptive community resilience. Score 0 is the lowest resistance and score 1 is the highest resistance score.

3. RESULTS

By looking at the focus and stages of post-disaster recovery, it is known that post-disaster recovery is a complex process because it is multi-aspects and requires a very long time. In areas that have a high level of hazard (hazard) and vulnerability will not be affected if the community also have a high resilience of disaster (Cutter, Barnes, et al. 2008).

Community resilience is an important aspect in supporting the post-disaster recovery process (Cutter, Barnes, et al. 2008; FEMA 2011; Olshansky, Hopkins and Johnson 2012). Resilience can be defined as the ability to survive and protect ourselves from disasters with the least impact and damage (Berke in Cutter, 2008).

According to Cutter (2008), DROP Model has two types of disaster resilience. The first resilience is called inherent resistance. The inherent resilience focus is to reduce the impact caused when a disaster occurs. While the second resilience is adaptive resilience that emphasizes the ability of the community to do social learning and improvisation in the event of a disaster. In this study, the discussion will focus on community adaptive resilience with indicators including: community knowledge of disasters, community response to disasters and local wisdom prevailing in the community in support of post-disaster recovery.

Community Knowledge as Social Capital in Supporting Post-Disaster Recovery

Analysis of community knowledge becomes one of the basic social capital in determining the level of community resilience in a region. Community knowledge can help the community to learn from disasters and demonstrate the community's ability to make decisions in post-disaster recovery planning. Based on the results of the analysis, it is known that the community's knowledge in disaster aspects is quite low. This was assessed based on knowledge of disasters that were generally low and obtained a score of 0.4. Knowledge of the rehabilitation process is also low with a value of 0.2. Besides that, the condition of the community is also not supported by an understanding of disaster response with "the knowledge of things that must be taken when a disaster" scores of 0, and a score for experience of 0.4. In addition, the level of community participation in socialization and disaster response training was also low with a score of 0.2 which was caused by the fact that there had never been any such training in Cihamerang Village. Limited access to information and low level of education to obtain knowledge and translate information is still low with a score of 0.2. Understanding of good and right building structures is also quite low at 0.2.

In general, people's knowledge of the aspect of disaster is quite low with a score of 0.29. In the indicators of community knowledge on aspects of disaster, almost every variable has a low score of below 0.4. This indicates poor conditions. Community knowledge is needed as a foundation for rebuilding that takes into account aspects of sustainability and resilience to disasters. Community knowledge is one of the factors of the success of post-disaster recovery that was put forward by FEMA (2011). Community knowledge of disaster aspect can indicate a large opportunity for the community to reduce future risks and avoid environmental consequences and can influence the role of the community in the effort to develop future risk reduction strategies and the role of the community in decision making. Low community knowledge of disaster aspects will tend to hinder the post-disaster recovery process that is sustainable and increase the risk of future disasters.

Community Response When a Disaster Occurs

This analysis aims to explain how people save themselves in the event of a disaster, this can indicate how prepared people are in dealing with disasters and the impacts they can cause and can explain indications of ability to recover. The following are the results of obtaining questionnaires for community response to disasters.

The community's response to disasters is considered quite good with a score of 0.67. This response is determined based on salvation of personal, family and property. Self and family rescue responses get a score of 1 while rescue of property gets a score of 0 or there is absolutely no community that feels that it is important to save property. This is because there is no urgency arising from the community to save property. Human resources and capital resources are important aspects in the post-disaster recovery process (Glazer 2015). Communities in general already know that it is necessary to save themselves and their families even if not with property. In post-disaster recovery, the available resources are one of the important elements, both human resources and financial resources. By saving ourselves, family and property, we can support the provision of resources in the post-disaster recovery process.

When viewed from learning taken from "Jogja gumegrah", residents use the debris and property left to rebuild after the disaster. This accelerates and streamlines the post-disaster recovery process. In the case of Cihamerang Village, it can be said that human resources can be optimized in support of the post-disaster recovery process but will be constrained in terms of development capital and financial aspects. This is indicated also by the fact that the public is concerned about the obstruction of independent rebuilding due to limited capital and financial funds. Some communities also felt that they were not properly accommodated because only a few families received helps from post-disaster emergency tents.

Local Wisdom that Supports Post-Disaster Recovery

One of efforts to optimize post-disaster development is through community support and participation. Community participation can arise from various factors such as the existence of customs that allow the community to work and support recovery, there are certain cultures or values that are held by the community and there are movements and motivators of the community in the post-disaster recovery process. Based on the results of interviews with stakeholders it is known that Cihamerang Village is one of the villages that is still strong in its village characteristics and local wisdom. The people of Cihamerang Village still uphold the principle of mutual cooperation called *"abah anom"*.

The principle of *"abah anom"* prioritizes mutual cooperation in solving a problem, prioritizing safeguarding the environment and tends to reject modernization. The principle of "abah anom" order is guarded by every hamlet head in 4 hamlets in the village of Cihamerang. In addition, there are opportunities for "abah anom" principles to help optimize post-disaster recovery because it still leads to mutual cooperation, environmental conditions and listening to leaders so that people can be easily mobilized. This was conveyed by the West Java Provincial Disaster Management Agency which said that the recovery will occur sooner. It said that Cihamerang Village could be the modelling area in recovery process because its local wisdom. Even so, there are some problems such as lack of formal education and the technology lags when compared. But in terms of disaster, they are more resilience than ordinary villages.

In general, the prevailing local wisdom in Cihamerang Village is quite good with a score of 0.68. This score is above the moderate value of 0.6. This shows that public perception of disasters, motivation and potential community participation can support post-disaster recovery efforts. The role of local community wisdom can accelerate the recovery process after a disaster (Alipour, et al. 2014). The characteristics of rural communities in Cihamerang Village which are still very strong with mutual cooperation efforts can be a potential in supporting the post-disaster recovery process. In addition, the villagers of Cihamerang have good motivation in an effort to revive after the

earthquake disaster. The perception of the existing community and leaders is one of the capital for the government in conditioning community participation in the context of post-disaster recovery.

Total Score Assessment

It is known that the total score of the assessment of community resilience in Cihamerang Village is 0.54. This score can be classified as a moderate score where resilience is considered sufficient to support the post-disaster recovery process. This score is obtained by seeing that there are potential local wisdoms that can support post-disaster recovery such as anomal culture and perception and motivation to recover but there are still limitations such as knowledge, funds, access and information to optimize these potentials. It can be said that this score is in accordance with the assessment of the condition of the existing that occurred in the Cihamerang Village. So far there have been no independent recovery by the community or local communities to recover.

In a study conducted by Alipour et al (2014), the challenges and problems of recovery after the earthquake disaster in rural areas consisted of several categories, namely social vulnerability of the community, lack of comprehensive recovery planning, neglect of social capital and natural resources, and psychological problems post recovery community. Vulnerability problems illustrate that communities as part of participants in the recovery process can weaken the recovery process with limited experience and perception of disasters and post-disaster recovery. In the case of Cihamerang Village, it was known that both the preparation for recovery and resource optimization had not been carried out. Although the perception of the community is good in recovery efforts, but the experience of the community in facing disasters and seeking recovery is still very low so that the recovery process will tend to be hampered.

This is illustrated by the lack of public awareness and inefficient government institutions in taking part in the post-disaster recovery process. In the post-disaster case in Cihamerang Village, the government's readiness to respond to the disaster was very poor. Based on the recovery period after the disaster based on FEMA Framework (2011), in the second month there has been a plan for recovery of development, but the government is still in the stage of revalidating damage and loss data. The government also did not prepare the condition of the community either to respond to disasters or in the post-disaster recovery process, even wrong in analyzing the potential disasters in Cihamerang Village by classifying the area into safe areas against earthquakes. In addition, it is known that this inefficiency arises due to the lack of relations and cooperation between stakeholders and the lack of capacity of people working in the system. Each stakeholder is known to move each other and does not coordinate with each other.

The second problem is the lack of a comprehensive recovery plan. Until now, the Cihamerang Village post-disaster recovery process has only reached the stage of revalidation of damage and loss data. After re-validating the data, a study on post-disaster rehabilitation and reconstruction can be carried out. It can be said that the planning process is hampered due to limited data, information and research related to post-disaster conditions, especially related to community conditions including prevailing socio-cultural conditions resulting in plans that are not able to answer existing needs and problems. Initially, the data obtained about the condition of Cihamerang Village was not in accordance with the standards imposed by the BPBD of Sukabumi District, both regarding the physical and social conditions of the community after the disaster so that the government had to revalidate the data to begin the study in planning rehabilitation and reconstruction. This condition is interrelated with people's knowledge and understanding of the conditions that occur and what to do. Limited knowledge of the community hampers the data collection process so that the recovery planning process is also hampered.

4. DISCUSSION

The importance of community resilience in regional development in the context of post-disaster recovery can be seen from the various experiences of disaster response that occurred in various regions in Indonesia and in areas outside Indonesia. Some regions are outside Indonesia, if the policy making process can be referred to, and some case studies are in Indonesia as a review of the development of post-disaster recovery aspects in Indonesia. Broadly speaking, this case study is expected to show how each policy, especially in the context of community resilience both through community roles and participation, can describe the results of post-disaster recovery in an area.

Based on studies conducted, it is known that there are several countries that directly involve the community in the post-disaster recovery process, especially in planning for rehabilitation and reconstruction. Community resilience and the ability of the community to support the recovery process determine the various outcomes of the post-disaster recovery process. One example is the recovery process carried out in China, precisely in Sichuan Province (Olshansky and Johnson, 2016). The Chinese government takes a top-down approach by building its own council in handling the recovery process in China. Community involvement and consideration of the condition of the community after the disaster was not carried out. This resulted in the planning process not being comprehensive even though development was carried out very quickly. The result of rehabilitation and reconstruction in China is the physical rebuilding that is in line with the development goals planned by the Chinese government, but is problematic in the social aspects of society, namely the loss of people's livelihoods, social problems such as trauma, and so on. In a fairly short period of time, the economy in China is back in trouble after the earthquake disaster.

The most interesting example can be found in post-disaster recovery in Gujarat, India (Olshansky and Johnson, 2016) and Yogyakarta, Indonesia (Leitmann 2007). In the post-disaster recovery process in India, active stakeholders play a role in the planning process to post-disaster development. One example is the division of labor in NGOs as researchers and financing managers, the government as policy makers and the community as subjects and objects in development in collaboration with NGOs to increase capacity, develop plans, and rebuild homes. This can be assessed from how infrastructure in India can build a better quality of life after a disaster. Whereas in Yogyakarta, Indonesia community works together by utilizing the remaining debris to rebuild infrastructure and housing. In addition, there is a special organization to regulate post-disaster reconstruction financing in Yogyakarta. Meanwhile, the resilience of the Yogyakarta community is considered as one of the factors that can succeed in the post-disaster recovery process in Yogyakarta, which is measured through the speed of post-disaster recovery in less than 3 years followed by economic growth. In the above case, it can be seen that the community resilience plays an important role in the post-disaster development planning process to reach sustainable development.

In this study, the prevailing local wisdom in Cihamerang Village is quite good to be use as the aspect in strengthening the resilience of a place. This study shows that public perception of disasters, motivation and potential community participation can support post-disaster recovery efforts as the role of local community wisdom can accelerate the recovery process after a disaster (Alipour, et al. 2014). The characteristics of rural communities in Cihamerang Village which are still very strong with mutual cooperation efforts can be a potential in supporting the post-disaster recovery process. In addition, the villagers of Cihamerang have good motivation in an effort to revive after the earthquake disaster. The perception of the existing community and leaders is one of the capital for the government in conditioning community participation in the context of post-disaster recovery.

5. CONCLUSION

This research focuses on community resilience in the post-disaster recovery process. This study reviews the adaptive community resilience which is measured based on 3 indicators, namely community knowledge, community response and local community wisdom that can support the post-disaster recovery process.

These three things are considered important in determining how quickly the recovery process after the earthquake disaster takes places. Based on the results of the analysis, it is known that the community's knowledge in disaster aspects is quite low. Whereas, it is known that the response of the people in Cihamerang Village in responding to disasters is quite good in saving themselves and their families, while being low in saving property when a disaster occurs. In general, local wisdom and values in Cihamerang Village are also quite good and have the potential to support the post-disaster recovery process. Existing values such as mutual cooperation and public perception of the community and the region are also good and positive which provide opportunities for support of the recovery process will be done well. It can be said that in general, adaptive resilience of the people of Cihamerang Village is moderate because there are still aspects of low assessment and there are several obstacles and problems.

However, coordination between stakeholders is needed to optimize existing conditions. Stakeholder involvement includes coordination in policy making, capacity building, implementation, and financing. This is so that constraints that reduce community resilience in supporting the post-disaster recovery process can be overcome and post-disaster recovery can be implemented not only quickly but also respond to future challenges in the region.

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