

## **The Adaptability of The Society in Dealing with The Vulnerability of Earthquake Threats in Bantul**

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### **Abstract**

Earthquake in Bantul on May 27, 2006 brought catastrophic impacts for society as the victims. There were the most serious damages and highest number of victims in Bawuran Village. On the other hand, Srigading Village had the lowest damages and there was no victim. Bawuran Village is located on graben which causes its vulnerability towards earthquake threat. Meanwhile, Srigading Village is situated on 3-10 meters above the sea level, which makes it vulnerable to tsunami. The adaptation capacity is very important to minimize the costs of natural disasters. Based on the reviews of those backgrounds, the researcher will examine the societal adaptation capacity in Bawuran and Srigading Village regarding to its vulnerability towards tsunami and earthquake. Societal adaptation capacity can be seen as society's readiness in facing natural disasters. This research uses qualitative-descriptive method. Data collecting techniques are done by using literature study, field observation through interview and documentation. The researcher also has conducted an in-depth interview with the local government i.e. the officers of Regional Disaster Management Agency (BPBD) in Bantul Regency. The result of this research is to find out the society's adaptation capacity towards earthquake, drought, landslide, flood, fallen tree, tornado and river flow closing in Bawuran Village. Meanwhile in Srigading Village, the risk of tsunami, flood and puddle have been found. The society's adaptation capacity in Bawuran and Srigading Village can be assessed by using economic growth, social capital, information and communication, and social competence. Based on those assessments, societies do not have readiness in facing disasters yet. It is caused by poor economic condition, inadequate economic resources with low incomes in Bawuran Village, and the uneven population of Srigading Village. The networks within the community have not been fully developed. The community also cannot access information through the internet network. This is due to the unavailability of internet facilities in the two villages. It also lacks of disaster management competency. This condition is indicated by the absence of disaster programs in the two villages. Awareness from the society, especially the victims in responding disasters is also needed. The result of research shows that societies do not have readiness in facing any upcoming disasters yet.

### **Keywords:**

disaster; vulnerability; adaptability.

### **Introduction**

Earthquake is a disaster that is ranked as high level threat. Earthquake can cause severe damage and can also cause fatalities. The earthquake that occurred in 2006 killed 5,048 lives and injured 27,808 people. Most victims were in Bantul with 4,143 deaths, 8,673 serious injuries, and 3,353 minor injuries.

Meanwhile, the number of houses that were damaged was 240,396 houses. Based on the Constitution no. 24 in 2007 about Disaster Management, the Government and Local Government become the responsible in the implementation of disaster management. Bantul District Government, through the Decree of Bantul Regent, No.13/2008, assigned

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the Implementation Team of Bantul District Government in Cooperation with GTZ Germany in order to realize the Early Warning system of earthquake and tsunami in Bantul District. Efforts are taken as part of reducing the existing vulnerabilities. Disaster vulnerability is really potential towards loss (Mitchell, in Cutter 1996: 531). Disaster victims will be under difficult physical and psychological conditions (Siu, 2016). Bantul people who are in vulnerable condition are the first people that are affected. Society has great potential in vulnerable condition (Schneiderbauer and Ehrlich, 2006: 84). Thus, it is necessary to reduce the vulnerability and increase the adaptation capacity of the society in facing the disaster. Noris et al. (2008) in Kusumasari (2014) explained that there are four kinds of adaptation capacities, such as economic growth, social capital, information and communication, and society's competence. Adaptability affects how individuals or societies respond to the negative effects of a disaster that is also a mechanism in facilitating toughness towards disaster (Partini, Kusumasari, and Suyatna, 2014: 17).

The people of Bawuran Village are in vulnerable condition. This is because people live in the areas that are prone to earthquakes. Bawuran Village area has quite high potential for disaster because its location on a hill clamp fault (graben) does not mean safe, but it is dangerous (the Goddess, 2012). Dewi in her article entitled *Geology and Geomorphology Analysis of Bantul Regency*, the fault is the result of a diastrophism and tectonic process and had great energy underneath so that it can be said that the region which located in a fault such as Bawuran village is prone to earthquakes. The earthquake energy centers (hypo-centrums) which existed in Bawuran Village were influenced by the subduction of Hindia oceanic plate crust with Asia continent's plate. When the fault is shaken then the area in front of the fault will be shaken too. The subduction of the Hindia Ocean plate with

this Asia continent's plate, plus the influence of volcanic forces, triggered a high seismic force. These conditions indicate that the society needs a special strategy to survive in an earthquake-prone area. Meanwhile in Srigading Village based on the data of House Damage Ratios due to Bantul Earthquake May 27, 2006, Srigading Village is the area with the lowest damage ratio of 12.5-25% with no casualties, if it is compared with the Bawuran village which experienced the highest damage ratio of 75-100% (Yamazaki and Matsuoka, 2008). Based on Data of Bantul Regency in 2013, Srigading Village has vulnerability to the threat of tsunami disaster. Srigading village that is located at an altitude of 3-10 meters above the sea level (<https://bantulkab.bps.go.id>) has a great chance of tsunami.

Before tsunami happens, it will be preceded by an earthquake; large earthquake shocks can cause tsunami. One of the efforts that can be done to minimize losses due to earthquake is to do the adaptability of the society. The importance of adaptability as an effort to reduce the risk of a disaster is essential to build the society's endurance to disasters. Society is the object that becomes the victim when they are faced with the disaster. Therefore, the researcher tries to examine the adaptability of the society by looking at the extent of adaptation capabilities that have been done by Bawuran Village people who suffered the worst damage and the highest number of casualties in comparison to the people of Srigading Village who did not receive a big impact towards earthquake threat that occurred in the last May 2006. Bawuran and Srigading Village are in vulnerable condition. It can be seen from how far the readiness of Bawuran Village people who become the victims of earthquake with the readiness of the people of Srigading Village to face future threats. Thus, the researcher conducted a research with the title of the adaptability of the society of Bawuran and Srigading Village in

facing the vulnerability of earthquake threats. Formulation of the problem in this research is, (1) what vulnerabilities that are existed in Bawuran and Srigading village?, (2)How is the adaptability that has been done in Bawuran and Srigading village?. Thus, this research is aimed to identify any vulnerability existed in Bawuran and Srigading village and Analyze the adaptability that has been done in Bawuran and Srigading village.

## Theoretical Framework

### Vulnerability

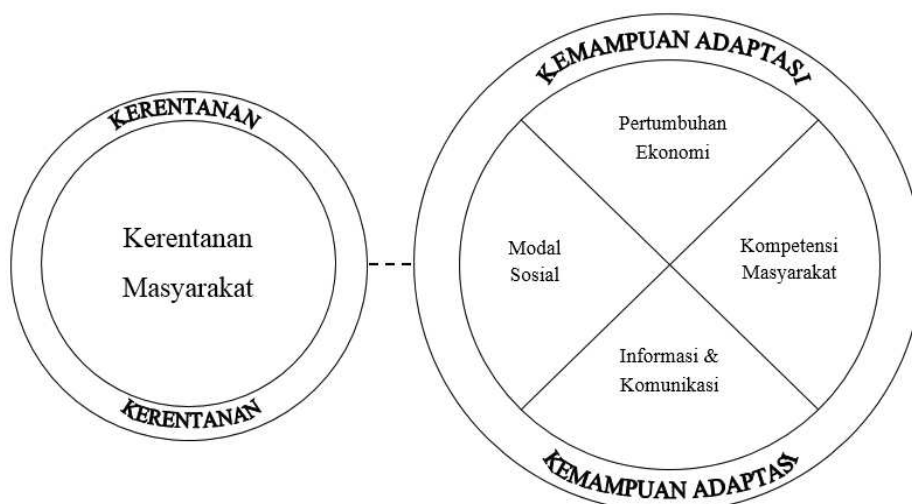
The vulnerability is a risky situation if exposed to danger, (Keim, 2011). Cutter (1996: 532), in McEntire (2012) suggests that vulnerability is a possibility that an individual or group will be exposed and affected by danger. Mitchell in McEntire (2012) states vulnerability is a potential loss. Birkmann et al., (2006) defines vulnerability in terms of potential damage, destruction, and many other factors. The vulnerability is a threat to affected people (Gabor and Griffith McEntire, 2012). The vulnerability is a measure for the level of potential damage that would be caused by certain hazards (Boulle et al., 1997: 179). The

vulnerability is the insecurity of individuals, households, society in facing the changing environments (Moser and Netherlands, 1997: 2). McEntire (2012) said that this vulnerability is an indicator that becomes vulnerable is the society.

### Adaptability

Meanwhile, adaptability means that it comprehends the ability of the society or community to change or adapt to changes that exist in reducing vulnerability (Welle, and Birkmann, 2015). To study and solve problems from the purpose of this study, the researcher used the theoretical concepts that exist in adaptability. To further focus this research the researchers adopted the theory from Norris et al., (2008) which sees in terms of adaptability, i.e., the adaptability of the society in dealing with vulnerability (McEntire, 2012) of disaster threats. Quoting from Norris et al., (2008) in the Kusumasari journal (2015) entitled *Women Adaptive Capacity in Post Disaster Recovery in Indonesia*, said that the adaptability focuses on four main concepts. Of the four main adaptability concepts, the researcher examined the indicators of each concept of the journal Norris et al., (2008), entitled *Community*

Figure 1.  
Vulnerability and Adaptability



Source: Developed from McEntire (2012) and Norris et. al., (2008) in Kusumasari (2015) *Adaptability Describes Endurance*

*Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness*, which explains four main devices from adaptability, namely: (1) *Economic growth. The indicators: the diversity of economic resources, and fairness in resource.* (2) *Social capital. The indicators: network connection, social support, and community ties.* (3) *Information and communication. The indicators: inform the public, and narrate (telling experience).* (4) *Society's Competence. The indicators: joint action in policy making, and society empowerment.*

## Discussion

### The Adaptability of the Society in Bantul Regency in Dealing with Earthquake Threat

In accordance with the concept of adaptability conveyed by Noris et al., (2008) that adaptability is the process of connecting to a positive trajectory and adapting after disturbance or danger, stress and difficulty to create a strong society (Noris et al., 2008). There are four main concepts of adaptability, i.e., economic growth, social capital, society's competence, and information and communication which will be discussed and analyzed by the researcher as a model of adaptability effort of the society which is an effort of BPBD Bantul regency as a *leading sector* in the implementation of disaster management. Thus, it will be known that how are the efforts of Bawuran Village people's adaptability in facing the earthquake threat. The following explanation is related to the four main concepts that affect the adaptability of the society in Bawuran and Srigading Village.

#### Economic growth

##### 1. Resource Diversity

The diversity of resources possessed by the people of Bawuran Village has not been able to make people to have preparedness in facing the disasters in the future. However, the people of Srigading Village have more preparation in facing the disasters.

##### 2. Justice in Resources

The endurance of resources owned by Bawuran Village people after the earthquake is good. It is also the same as the society in Srigading Village.

#### Social Capital

##### 1. Network Linkage

The society's adaptability in this case is represented by the disaster's volunteers in the community and the village of Bawuran and Srigading in creating a good network, is able to prepare the local communities in facing the disaster.

##### 2. Social Support

The endurance of the society is shown by the concern of the local community towards the needs and welfare of disaster's victims, which is a form of community endurance.

##### 3. Community Ties

One community is together with another community from Bawuran Village that has bonds.

#### Information and Communication

##### 1. Inform the Society

Providing good information from BPBD to disaster volunteers in the community and from the community to BPBD get good and fast response in Bawuran Village and also in Srigading Village.

##### 2. Narrate (Telling the Experience)

The ability of the society to share their experiences is part of the community's endurance in their preparation when facing disaster. The society can learn from previous disaster experiences to avoid the dangerous impact that is occurred.

## **Society's Competence**

### *1. Joint Actions in Policy Making*

The involvement of the society in making the policy shows the endurance of the community in reducing the existing vulnerability, so that it has more preparedness in facing future disaster threats.

### *2. Society's empowerment*

The people of Bawuran Village have not been empowered when compared with the Srigading villagers who are slightly more empowered in their preparedness in facing the disaster.

The research that is conducted by Norris et al., (2008), entitled *Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness* with the research findings indicate that the ability to adapt to economic growth, social capital, information and communication, and the competence of the society explained that the community has the potential to function effectively and successfully adapt to the post-disaster. The society's adaptation is manifested in the health of the population, which defined as high levels of mental health, behavior, and quality of life and no different. The researcher's research entitled *The Adaptability of the Society in Bawuran Village, and Srigading Villages in Facing the Vulnerability of the Earthquake Threat* indicates that the society is not ready to face the threat of disaster. This condition is shown from the findings of the strengths and weaknesses of this study. Based on the adaptability of the society proposed by Norris et al. (2008) consisting of economic growth, social capital, information and communication, and society's competence, so Table 5.1 shows that from the adaptation capabilities carried out in Bawuran Village and Srigading Village, there are some strengths and weaknesses. Strength shows that adaptability has been done in Bawuran Village and in Srigading Village. Strength also illustrates the adaptability has

been possessed by the society. Meanwhile, the weakness shows that there is no adaptability in Bawuran Village and Srigading Village yet. The weakness illustrates the lack of adaptability in Bawuran and Srigading Villages. The adaptability which is owned has shown that people already have the preparation in facing the disaster. Such strengths and weaknesses of the four indicators of society's adaptability (Norris et al., 2008) can be seen in Table 1.

The result of data analysis from the data that the researcher found shows that there is weakness of the society's adaptability. The weakness of adaptability is found in Bawuran Village and Srigading Village. The weaknesses illustrate that the community does not have adaptation capability in dealing with disasters yet. The disaster occurrence cannot be ascertained. The society's preparedness is needed in order to face them. The society's preparedness in facing the disaster is part of community endurance. The weaknesses that are existed in Bawuran Village and Srigading Village can be used as a recommendation in disaster management in the future.

## **Conclusion**

The vulnerability in Bawuran village is vulnerability towards the threat of earthquakes, droughts, landslides, flooding, fallen trees, hurricane/tornado, and the closing of the flow of the river. While the vulnerability exists in Srigading village is vulnerability to the threat of tsunami, flooding and inundation. After the 2006 earthquake, seen from four capacity of society's adaptability. First, the economic growth in Bawuran village is lower than Srigading village. Bawuran village people public income is low, and there are some people who do not have a business/unemployment. While at Srigading villages, poor people are facilitated by the provision of venture capital, so that the poor economic conditions will be improved. Rural poor people can produce Srigading local cultural potential such as Adrem cake production. Second,

**Table 1.**  
**Strengths and Weaknesses from the Adaptability of the Society**

The Society's Adaptability	Indicator	Strengths (+)	Weaknesses (-)
Economic Growth	1. Diversity of Economic Resources	<ul style="list-style-type: none"> <li>a. People's livelihoods are diverse.</li> <li>b. People's livelihoods in Sanden sub-district are mostly teachers/lecturers.</li> <li>c. The education level in Srigading Village is up to bachelor level (S1).</li> <li>d. The quality of health service that is received by the people of Bawuran village who are victims of disaster are considered good. All affected societies receive health services.</li> <li>e. The number of poor people (3,181 people) in the village of Srigading get BPJS assistance from local government.</li> <li>f. The poor in the village of Srigading are given access to seek capital with cheap and easy funds. Rural Credit Enterprise (BUKP) as an economic improvement of society. Adrem cake is the work of the poor in Srigading Village which is part of the local potential of the society.</li> </ul>	<ul style="list-style-type: none"> <li>a. There are some people of Bawuran Village who do not have a job (unemployed), but the number is not that high.</li> <li>b. People's livelihoods are dominated by workers.</li> <li>c. The income of the society in Bawuran Village is in low category.</li> <li>d. Education level in Bawuran Village is in low category, generally graduated from elementary/junior high school, so it is limited to the opportunity to get better job opportunity.</li> <li>e. The culture of Bawuran Village people who tend to choose to work in comparison to continuing education.</li> <li>f. Limited economic condition of Bawuran Village society, so they choose not to proceed to higher level of education.</li> <li>g. Lack of awareness from Bawuran Village people about the importance of education.</li> <li>h. Bawuran Village people buildings before the earthquake only use cast (do not use cement and iron) so that the number of victims caused by the ruins of buildings that are struck them down.</li> <li>i. The people of Bawuran Village do not have health insurance because of financial limitations.</li> <li>j. Until now, trauma is still felt by the people of Bawuran Village.</li> </ul>
	2. Justice in Resources	<ul style="list-style-type: none"> <li>a. Post-earthquake, government in this case BPBD Bantul District, FPRB and NGOs, provide socialism about disaster.</li> <li>b. In general, people receive socialization given because they learn from the previous experience.</li> <li>c. The government's concern in this matter BPBD towards earthquake disaster victims is in high category.</li> <li>d. The houses of the people in Bawuran Village has been built better than before, it already has reinforcement.</li> <li>e. The awareness of all elements of the local community of Bawuran Village to the people who become the victims of the disaster.</li> </ul>	<ul style="list-style-type: none"> <li>a. Before the earthquake disaster, Bawuran Village people do not have any insight about natural disaster.</li> <li>b. The presence of Bawuran Village society in the socialization of the disaster has not been presented as a whole.</li> <li>c. There are still people from Bawuran Village who have not yet felt the importance of socialization about disaster.</li> <li>d. BPBD still has weaknesses in dealing with disaster management; it is due to the limited number of personnel and the extent of the coverage of the disaster areas that must be addressed. BPBD also has limitations in equipments and funding.</li> <li>e. The people of Bawuran Village have no investment because of economic limitations.</li> </ul>

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Social Capital	1. Network Linkages	<p>a. Networks of trust or trust have been established in Bawuran Village and Srigading Village. The people have faith in BPBD. Public confidence is strongly indicated by the awareness and high response from BPBD in addressing the disaster problem.</p> <p>b. The community (disaster volunteers) always build networks with the government by always doing the communication.</p>
	2. Social Support	<p>a. The victims, especially children, were given road facilities as trauma relief after the earthquake. Children get special attention in disaster management</p> <p>b. Local entrepreneurs help the affected communities</p> <p>c. Food aid for disaster-affected people is sufficient and some even remain</p> <p>d. Assistance to disaster victims from government, NGOs, and from overseas comes quickly, can cure trauma for disaster-affected societies</p> <p>e. The people of Bawuran Village and the people of Srigading Village have a concern to help others (the attitude of working together)</p>
	3. Society's Bonds	<p>a. There is a bond between communities, it is shown by mutual help, and participate in the society participation in helping the victims of disasters</p>
Information and Communication	1. Inform Society	<p>a. Information related to disaster information, directly from the location of the incident from disaster volunteers in the field directly to BPBD. BPBD responds and determines the right and quick follow-up in disaster management.</p> <p>b. There is a quick response from BPBD, and even the BPBD directly goes down to the field in a short time.</p> <p>c. Sanden Sub District has an early warning tool for disaster.</p> <p>d. Communication is done through FPRB as an extension of BPBD.</p> <p>e. Communication has been going well lately.</p>

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	2. Narrate (Telling the Experience)	<ul style="list-style-type: none"> <li>a. People are able to remember and tell the events of 2006 earthquake, this condition becomes a lesson and experience to face the next earthquake.</li> <li>b. People are more capable to take an action when confronted with disaster again.</li> </ul>	<ul style="list-style-type: none"> <li>a. Associated with the community's response to the disaster, it needs a process of giving awareness in understanding it.</li> <li>b. Need to habituate fast and appropriate responses to disaster threats</li> <li>c. Society needs to be reminded continuously</li> <li>d. The character of the people who easily forget the disaster can cause stuttering in disaster response so that it can have a major impact towards the dangers posed.</li> </ul>
Society's Competence	1. Joint Actions with Policy Makers	<ul style="list-style-type: none"> <li>a. The society is included in the creation of disaster documents, this is because the society is the victims of disaster who know the vulnerability that they possibly have, so as to reduce the vulnerability of disaster threats.</li> <li>b. The society participation in policy-making from disaster documents is a public aspiration space to participate in disaster management.</li> </ul>	
	2. Society's Empowerment	<ul style="list-style-type: none"> <li>a. Srigading village is designated as a tough-disaster village.</li> <li>b. Awareness of disaster in Srigading village was established.</li> <li>c. In community empowerment, BPBD has a strategy for people to make them to be able to dive in. BPBD involves FPRB as an extension to empower the people of Bawuran Village.</li> </ul>	<ul style="list-style-type: none"> <li>a. Community empowerment in the formation of a tough village disaster in Bawuran Village has not been done yet because it is not sufficient enough to be said as a tough-disaster village.</li> <li>b. Srigading village has not been effectively implementing the program, because it is limited in funding.</li> <li>c. The people of Bawuran Village still lack in understanding and concern towards the disaster.</li> <li>d. The society is very easy to forget the insight of socialism given about disaster.</li> <li>e. BPBD requires extra effort in empowering the society to have a high awareness towards the disasters' threat.</li> </ul>

Source: Processed Data of the Researcher, 2017

social capital that is built up in the society in the form of a network. Network indicates the trust or trust feeling that has been built in the society. The society has the faith on BPBD. The society's trust is strongly indicated by the awareness and high response from BPBD in addressing the disaster problem. Third, information and communication are going well, but awareness is needed from the victims of the disaster in responding the disaster. Fourth, the society's competence has not been well-established. The people of Bawuran Village are not yet competent in dealing with

the disaster. It is shown that Bawuran village has not been declared as a tough-disaster village. Meanwhile, the people of Srigading Village has more competence that is the establishment of Srigading Village as a tough-disaster Village, but not yet effective in the implementation of the program.

The ability of BPBD in Bawuran and Srigading village that are vulnerable has been maximized by conducting socialization/simulation/training about disaster in those two villages. BPBD capability is also shown from

the rapid response of BPBD in responding to disaster. BPBD directly goes down into the field and immediately conduct a disaster management quickly. BPBD is able to establish a good cooperation with FPRB, and it is shown that the existence of FPRB in every village in Bantul District as an extension of BPBD for implementing the tasks in the field.

The society of Bawuran and Srigading village do not have the adaptability in facing the threats of disaster vulnerability due to several factors, including economic growth factor, i.e., economic resources are not adequate to the low income of the people in Bawuran village, and the uneven income of Srigading Village people. Social capital factor i.e. there is no network that is built as a whole in the society yet. Information and communication factor i.e. the public cannot access information through the Internet network due to the unavailability of the Internet facilities in the two villages. Society's competence factor is that the society is not yet competent in responding to disaster, this condition is indicated by the abandoned disaster programs in the two villages.

### **Suggestions**

Based on the findings and data analysis with the concepts used, weaknesses are found in this research. From those weaknesses, the researcher provides suggestion/recommendation as follows:

1. To overcome the diversity of economic resources, then:
  - a. People who do not have jobs are given jobs that match their abilities, and are facilitated with knowledge to produce the existing creativity. Unemployed people are also given talent and potential development training that has not been empowered.
  - b. People who work as laborers are given the opportunity to get a better job by providing entrepreneurship training for at least three months

- c. Low-income societies are developed by providing business capital assistance
  - d. Village government/local officials provide understanding and education facilities funding for the society to get a better education, such as providing scholarships for the poor and local government scholarships for those wishing to study in the higher education.
  - e. The society is important to be given awareness of the importance of education for getting better job opportunities, such as counseling that is done for the local society.
  - f. The society is provided with business assistance and business training for the purpose of creating local potentials and the society is able to open an independent business.
  - g. All elements of the societies are gathered to gain socialization of additional insight about the importance of education as a provision to improve economic conditions and as an effort to avoid the threat of disaster.
  - h. The society is given the aid in the form of building materials and the society needs to be supervised by building with the sufficient materials sufficient to sustain from earthquake shocks.
  - i. Given community awareness through local neighborhood/hamlet to save a little income as a helper when facing with the disaster later on.
  - j. To eliminate the trauma about disaster for the victims, regular training of disasters can be done continuously, especially for children affected by disaster. Trauma can be eliminated with entertainment, such as picnics to places favored by the children.
2. To address the justice in resources, then:
    - a. After the earthquake disaster, the society is given a periodic understanding, as the society has been believed to have a

- correct and appropriate understanding in responding to the disaster.
  - b. The village government seeks the presence of the society as a whole, or the society is certain to have received socialization from the presented participants of socialization.
  - c. BPBD / FPRB / Local disaster volunteers provide an attractively presented socialization such as a motivational video appearance.
  - d. BPBD can involve potential villagers in assisting field tasks that have broad scopes.
  - e. The society is provided with business assistance that the people can save their income to be invested when they experience any difficulties.
3. To overcome narrate / telling experience, then:
- a. BPBD / FPRB / Volunteers and local government always to be reminded to respond to disaster appropriately.
  - b. The victims of the disaster are given regular training to make them able to respond to disaster quickly and appropriately.
  - c. Provided disaster training for the society
  - d. The people are prepared to be able to respond to the disaster.
4. To overcome society empowerment, then:
- a. The society is prepared to have endurance in addressing disasters.
  - b. Supportive programs as a tough-disaster village can run well and are carried out on a regular basis.
  - c. The society is prepared to have awareness towards the disaster, by involving all elements of society and related institutions in every socialization that is conducted.
  - d. Disaster volunteers always remind people to always take lessons from the disaster that has happened by learning from previous disaster experience.

- e. BPBD by empowering FPRB as an extension in the field. FPRB involves all elements of society by incorporating them in the program activities in the village so that it can reach all the people to create a high awareness of the magnitude of the dangers of disaster.

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