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WHIRLWIND DISASTER MITIGATION IN SUNGAI TABUK SUB-DISTRICT, BANJAR REGENCY

Deasy Arisanty¹, Eva Alviawati², Karunia Puji Hastuti³, Parida Angriani⁴, Putri Hilal Aulia Lasmi⁵

¹Geography Education, Faculty of Teacher Training and Education
Lambung Mangkurat University. Indonesia

² Geography Education, Faculty of Teacher Training and Education
Lambung Mangkurat University. Indonesia

³ Geography Education, Faculty of Teacher Training and Education
Lambung Mangkurat University. Indonesia

⁴Geography Education, Faculty of Teacher Training and Education
Lambung Mangkurat University. Indonesia

⁵Geography Education, Faculty of Teacher Training and Education
Lambung Mangkurat University. Indonesia.

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ABSTRACT

Mitigation is an adaptation in the form of efforts to prevent or protect community infrastructure and others from disasters based on an analysis of events that have occurred and losses experienced. Disaster mitigation is divided into 2: structural mitigation and non-structural mitigation. This research aimed to analyze the whirlwind disaster mitigation in Kecamatan Sungai Tabuk, Kabupaten Banjar. The method in this research is a qualitative method in which data collection uses the snowball technique. The research subjects were 12 informants consisting of stakeholders and the community, 3 of BPBD, 1 of the Dinas Sosial, 1 of Kecamatan, and seven people from the district. Data processing in this research uses source triangulation and method/technique triangulation. The data obtained were then analyzed descriptively, data collected, data reduced, data presented, and concluded. The results of the research indicate that the efforts of the government and the community regarding whirlwind disaster mitigation, both structural mitigation and non-structural mitigation, are still lacking. The lack of optimal disaster mitigation in the regions is due to the lack of coordination between stakeholders and the community and the lack of community enthusiasm for knowledge about disaster mitigation.

¹ Corresponding author.

E-mail addresses: deasyarisanty@ulm.ac.id

PENDAHULUAN

Natural disasters are disasters that occur due to disruption of the activities of natural components without human intervention. Many natural disasters in Indonesia occur due to the location of Indonesia which is between three plate confluences, namely the Indo-Australian plate which moves to the north, the Eurasian plate which moves to the south, and the Pacific plate which moves from east to west (Hermon, 2015). Head of the BNPB's Data Center for Information and Public Relations (National Disaster Management Agency), Sutopo Purwo Nugroho, stated that globally there has been a 35% increase in natural disaster cases in the last three decades. The increase occurs mainly in hydrometeorological disasters, or disasters that are influenced by weather aspects, such as floods, landslides, droughts, and cyclones. 80% of this hydrometeorological disaster occurred in Indonesia.

Tornado is one of the hydrometeorological disasters that has become an extreme weather phenomenon that the public needs to be aware of. Tornado is a local name for small-scale tornadoes that occur in Indonesia (Mujiasih and Primadi, 2015). Extreme weather is an unusual weather event that can result in losses, especially the safety of life and property. One of the dangerous extreme weather phenomena is a tornado (Satriyabawa and Pratama, 2016).

South Kalimantan is an area in Indonesia that is not spared from natural disasters even though the natural disasters that occur are different in form and nature from natural disasters in other parts of Indonesia (Kurnain and Soendjoto, 2016). Natural disasters that often occur in South Kalimantan are hydrometeorological disasters such as floods, landslides, droughts and hurricanes. Extreme weather is an unusual weather event that can result in losses, especially the safety of life and property. One of the dangerous extreme weather phenomena is a tornado (Satriyabawa and Pratama, 2016). South Kalimantan is mostly lowland with an average elevation of +17 MDPL, located at positions 1o21'49" – 4o10'14" South Latitude, and 114o19'13" – 116o33'28" (Central Bureau of Statistics, 2018).

Tornadoes that occur in South Kalimantan are common in plain areas such as Banjar Regency and the Hulu Sungai area. Although the wind speed is only 20-30 km/hour, it is very low when compared to storms on the American mainland which can reach more than 200 km/hour, but the twisting motion of the tornado is able to knock down semi-permanent houses and trees (Kurnain and Soendjoto, 2016) . According to the National Disaster Management Agency, in statistical data, hurricanes in the South Kalimantan region often occur in Banjar Regency. The recapitulation of the Regional Disaster Management Agency shows that the

impact caused by the tornado in Banjar Regency caused more casualties and damage. The following is a recapitulation of tornado events in Banjar Regency in 2015 – 2018.

Table 1.1. Whirlwind Incident in Banjar Regency in 2014 - 2018

No	Subdistrict	Number of events	House	Victim		Building Damage		
				KK	Soul	RR	RS	RB
1	Aluh – aluh	14	32	32	87	4	0	8
2	Aranio	1	2	2	0	0	0	2
3	Astambul	7	75	75	247	51	0	29
4	New Lucky	3	3	3	2	0	1	0
5	Love Puri Darussalam	4	38	38	6	18	1	14
6	Peat	22	82	82	294	10	8	21
7	Diamond Coral	4	16	16	53	2	3	7
8	Kertak Hanyar	8	43	43	70	4	23	1
9	City Martapura	11	69	69	216	0	5	7
10	West Martapura	8	82	82	238	45	0	23
11	East Martapura	5	22	22	61	4	2	6
12	Mataraman	4	12	12	17	0	0	1
13	Paramasan	1	1	1	0	0	0	1
14	Pengaron	4	11	11	42	0	0	1
15	Connect Prosperous	3	4	4	6	0	3	1
16	4-way intersection	5	13	13	13	3	4	3
17	Pinang River	1	1	1	0	0	0	1
18	Tabuk River	13	123	123	132	78	1	12
19	Bauntung Lake	2	1	1	5	0	0	0
20	Prosperous Tatah	3	3	3	11	0	0	2
AMOUNT		123	633	633	1500	219	51	140

Source: Banjar Regency Regional Disaster Management Agency (processed)

The recapitulation of tornado occurrences in Banjar Regency shows that subdistricts in Banjar Regency are very vulnerable to tornadoes, especially in Sungai Tabuk District based on the amount of damage to houses. Considering that hurricanes are dangerous disasters and difficult to avoid, disaster management efforts should be carried out to reduce the risk and impact of the disaster, one of the disaster management carried out before the disaster is disaster mitigation.

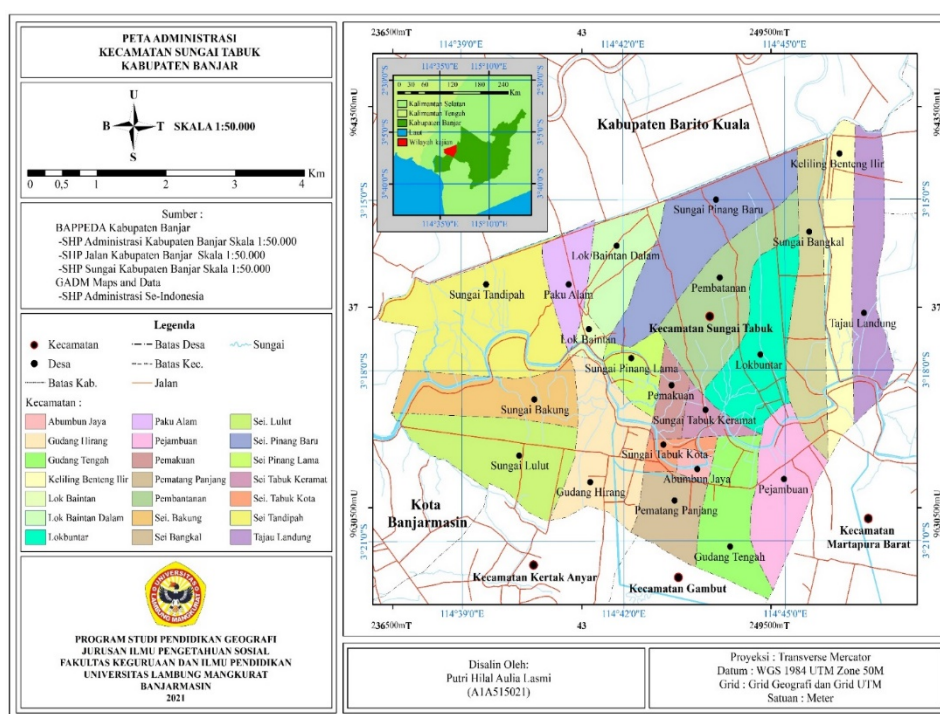
The impact of natural disasters can be reduced or prevented by disaster management in the form of disaster mitigation. According to Law Number 24 of 2017 concerning disaster management Article 1 paragraph 9, mitigation is a series of efforts to reduce disaster risk both through physical development as well as awareness and improvement of community capacity in dealing with hazards.(Ranto, Fathani, and Karnawati 2008).

RESEARCH METHODS

This research was conducted in an area prone to tornadoes, Sungai Tabuk District, Banjar Regency. The area suffered the highest damage caused by a hurricane, according to data obtained from the Banjar Regency Regional Disaster Management Office for the past 5 years. The research analysis used is descriptive qualitative analysis.

The data collection uses the snowball technique. The research subjects were 12 informants consisting of stakeholders and the community, namely 3 from BPBD, 1 from the Social Service, 1 from the sub-district and 7 people from the community. Data processing in this study uses source triangulation and method/technique triangulation. The data obtained were then analyzed descriptively, namely data collection, data reduction, data presentation and conclusion drawing.

Figure 1. Research Location



RESEARCH RESULTS AND DISCUSSION

A. Structural Mitigation

Structural Mitigation, is an effort to minimize the impact of disasters carried out through the construction of various physical infrastructure and using a technological approach, such as the construction of special canals for flood prevention, volcanic activity detection devices, earthquake-resistant buildings, or an Early Warning System used to predict the occurrence of disasters. tsunami waves. Structural mitigation is an effort to reduce

vulnerability to disasters by means of technical engineering of disaster-resistant buildings. Disaster-resistant buildings are buildings with structures that are planned in such a way that the building is able to survive or suffer harm that is not dangerous if the disaster in question occurs.(Basuki, 2019).

B. Building Code/Building Arrangements

Strategies to reduce the risk of hurricane disasters include setting zoning areas by setting specific building requirements in areas prone to hurricanes. It is necessary to apply building standard rules that take into account wind loads, especially in wind-prone areas (Priatmodjo, 2011).

There is still no building code/building regulation for natural disasters in Banjar Regency, only an appeal is given to people in vulnerable areas. On average, the houses affected by the hurricane are non-permanent and semi-permanent houses that use wood and zinc. Tornadoes can have an impact on anyone, not only non-permanent/semi-permanent houses because hurricanes are difficult to predict. There is still no policy on buildings that are resistant to hurricanes, either in the form of building codes or building regulations. Because the hurricane that occurs is very local/small, and people build houses are influenced by culture, environment, and economy.

C. Relocation and Community Assistance

Communities whose houses were damaged were not relocated only given assistance to repair the damage. Assistance to the community is provided after a disaster occurs. Assistance in the form of money (-+ Rp. 1,000,000) and logistics such as tarpaulins, instant noodles, mineral water, basic necessities, money and others. This finding is based on the Regent's Regulation (Perbup) Number 5 of 2014 the victims of the tornado were given assistance in the form of basic necessities and cash which was still in the disbursement stage (Banjar Regent Regulation, 2014).

Relocation is not possible because the land or land belongs to the residents themselves. Relocation is carried out if there is government land that is used as a place for relocation. Meanwhile, assistance is provided in the form of money and basic necessities” (DR, 2020 primary data). Relocation is not possible because the land belongs to the residents. Relocation may be carried out if there is government land that is used as a place for relocation. The assistance itself is in the form of money and basic necessities (DR, Primary Data 2020).

Assistance given to the victims of the hurricane was distributed after reports from the apparatus, sub-district, and RT. The assistance provided is adjusted to the existing damage, if there is no report from the party then the assistance cannot be distributed (NS, Primary Data 2020). Assistance will be given to the community after reports from the apparatus, sub-district, and RT. Assistance is adjusted to the existing damage and if there is no report then no assistance is received (NS, Primary Data 2020).

If there is a BPBD there is an appeal if there is a disaster, whether it's a hurricane, flood, fire, and others. Help must arrive before 24 hours. Assistance that came in the form of tents, basic necessities, clothes, and damage was given assistance to repair, there was no relocation (SY, Primary Data 2020). BPBD already exists to give warnings to the public not only about tornadoes but also fires, floods and others. Assistance must come before 24 hours in the form of tents, basic necessities, clothes and those who are damaged are given assistance to repair those who are not relocated (SY, Primary Data 2020).

There was no relocation, only assistance was given after experiencing a hurricane. Assistance given directly to victims. So the village hall does not know for sure the amount of assistance provided. Usually groceries and tarpaulins. The village hall only reports to the relevant office if there are wind victims in their village (JR, Primary Data 2020).

Assistance is given to the reported community with evidence of building damage and personal data such as identity cards, family cards and others. The provision of assistance is adjusted to the damage suffered by the victim. Assistance to victims in the form of logistics is adjusted based on the damage suffered. If the damage is less than 10 sheets of zinc (roof) it is declared lightly damaged, if the roof is completely damaged or has been blown away by the wind, it is declared moderately damaged, and it is declared seriously damaged if all the walls and roof of the house are damaged. Assistance can be proposed to BNPB if more than 10 houses are damaged, but assistance will be given after 3 months after the disaster because it is a long process.

This study found that not every victim who experienced a hurricane received assistance. There is help that does not reach the hands of the community. This shows that there is still a lack of coordination between the government/stakeholders and the community in Sungai Tabuk District in disaster management. Coordination between the government and the community is an important part in disaster management, this is in line with previous research (Faturahman, 2018) with the issuance of Law Number 24 of 2007 so that derivative policies were born along with the mainstreaming of disaster management planning and

funding. The law generally contains an important understanding, namely a change in the disaster paradigm that is focused on pre-disaster or risk reduction,

D. Community Shelter Assistance

There is no official shelter, but the Banjar Regency BPBD Prevention and Preparedness Division appeals to the public if there are signs of a tornado that will occur immediately find a safe place. More fatalities are avoided because the damage can be repaired, not with fatalities.

Evacuation has a category, for the national level the minimum affected by the disaster is 20 houses, handed back to the local government authorities. The policy of the regional head of Banjar Regency is that at least 10 units can establish public kitchens as long as they really see the situation and conditions or at the request of the sub-district. Temporary shelter can be handled in the sub-district, while it can be related to victims or possible buildings such as village halls, prayer rooms, and others.

The research findings are in accordance with the Regulation of the Head of the National Disaster Management Agency Number 7 of 2008 concerning Guidelines for the Provision of Basic Needs Assistance, namely temporary shelter/residential assistance provided in the form of tents, barracks, or public/social facility buildings, such as places of worship, sports buildings, village halls, and so on, which allow them to be used as temporary residences (BNPB, 2008).

E. Detection and Warning System to the Community

The tornado detection system is only available at the airport and at the BMKG which is also used to inform temperature, rain, wind movement, and others. The price of these tools is very expensive so it is not possible in every area to be able to monitor hurricanes. Early warning information is conveyed during coordination meetings held twice a year with district, sub-district, and community representatives. The information provided is in the form of an early warning. The district has a PUSDALOPS tasked with collecting data and information on natural disasters and exchanging information daily with the district and sub-district authorities.

F. Treatment System in the form of Controlling the Physical Environment by the Government or Stakeholders.

The maintenance and control of the physical environment in the Banjar Regency area is constrained by technology, it is difficult to predict where it will occur. Monitoring by satellite can determine the direction of the tornado so that there is enough time to provide early warning. However, changes in the weather system are very complex so that it is difficult to make predictions quickly and accurately (Wiarto, 2017). Therefore, the care and control of the physical environment has been entrusted to the community who are representatives during training and socialization. The community has been urged to carry out reforestation/greening. Farming culture in Banjar Regency, including Sungai Tabuk Subdistrict, rarely grows trees and plants on the edge of rice fields or around rice fields so that there are no windbreaks in open areas such as rice fields.

Figure 2. Open land and lack of windbreaks make it vulnerable to hurricanes



The findings of this study are in accordance with the opinion (Bahri, 2014) which states that the effect of land cover on a tornado disaster is that the less vegetation cover a place has, the higher the probability of a tornado occurring, and vice versa. The Tabuk River area is dominated by rice fields and open areas, this is in accordance with the above statement that the less vegetation cover in a place, the higher the potential for tornadoes. In this connection, the earth's surface receives solar radiation energy but the rate of heating varies from place to place due to different types of vegetation cover. This heating difference is reflected in the temperature of the air directly above the hottest surface.

G. Non-Structural Mitigation

Non-structural mitigation, as defined earlier, generally involves reducing the likelihood or consequence of risk through modification of human behavior or natural processes, without requiring the use of engineered structures. Non-structural mitigation techniques are often thought of as a mechanism by which "humans adapt to nature". they tend to be cheaper and fairly easy for communities with few financial or technological resources to implement (Rahman, 2017).

H. Mitigation Action Preparation

Preparation of mitigation actions is the initial stage of mitigation before and after disasters occur. Preparation of mitigation actions in the Sungai Tabuk sub-district is in the form of socialization. Socialization to the public is in the form of providing information or warnings if there are characteristics of a tornado such as dark skies and thundering sounds in the afternoon or evening, people must be careful. The socialization is held by the Prevention and Preparedness sector, routine socialization is carried out at the same time as training for communities in disaster-prone areas. Socialization is carried out in turns in certain sub-districts 2x a year. It all depends on funding and does not focus on hurricanes but other disasters as well. The social service has conducted outreach to the community and has even been to school.

Research findings about the characteristics of hurricanes occur in the afternoon or evening in the form of dark skies and thundering winds according to the statement (Satriyabawa and Pratama, 2016) namely the phenomenon of tornadoes that often occur in Indonesia during the transition season or the rainy season caused by the presence of Cumulonimbus clouds. The time of occurrence is mostly in the afternoon or evening with a short duration and is very destructive for the area it passes through. The research findings about the characteristics of a tornado are also in accordance with the statement (Wiarto, 2017) that the signs of a tornado that will occur are dark clouds, lightning and thunder can be seen from a distance, and the sound of wind rumbling from a distance is heard.

I. Raising Public Awareness

Increasing public awareness in disaster mitigation efforts requires collaboration between stakeholders and the community. One of the ways to increase awareness about disaster management is by holding training held at the same time during socialization. District-level training is usually held at the district/city BPBD by sending 2 representatives to each sub-district, while the provincial-level training is held at the provincial BPBD represented by 2 people from each district/city. The training carried out is to tell about how to adapt in a disaster-prone environment. Psychological training due to post-disaster trauma also exists and is held by the Banjar Regency Social Service with doctors who are already certified in their fields. There is a DESTANA or Disaster Resilient Village in the Sungai Tabuk sub-district, namely in the village of Lok Buntar. The village became DESTANA because it is very prone to natural disasters. DESTANA is a forum for disaster mitigation socialization and training. DESTANA also has a community economic recovery program after the disaster. The information is based

on what the informant said as follows: "The training in question is that during socialization, each sub-district sends representatives to become a disaster management team, usually 2 people are represented in each village" (AS, 2020 primary data).

The training was carried out during socialization, each sub-district sent a representative to be a disaster management team, each village was represented by 2 people (AS, Primary Data 2020). *"Training is the same as socialization, but not in all sub-districts/villages, only in disaster-prone areas. The logistics sector only focuses on aid distribution"* (YB, Primary Data 2020). Training and outreach were not carried out in all sub-districts and villages, only in disaster-prone areas. The logistics sector only focuses on the distribution of aid (YB, Primary Data 2020). Socialization and training were held in disaster-prone villages, namely in Lok Buntar village which has been formed into DESTANA or Disaster Resilient Village. In DESTANA there is a structure and work program. DESTANA itself was formed because the village often experiences natural disasters and not only hurricanes but also floods and fires. In addition to prevention, DESTANA also has a program on how to restore the economy after a disaster occurs" (DR, Primary Data 2020).

Gambar 3. Dokumentasi Saat Pelatihan dan Sosialisasi di Desa Lok Buntar yang Menjadi Desa Tangguh Bencana, Sumber: BPBD Kabupaten Banjar



J. Non-physical Environment Supervision and Control

In Supervision and Control of the Non-Physical Environment, the government and the community cooperate with each other. Contributions from the community are helping to repair the damage after the incident and the main thing is to save yourself and your family first during a disaster. Another contribution from the community is in the form of village funds. Disaster management has been budgeted for in the village fund. Meanwhile, the contribution from the sub-district itself only distributes assistance provided from BAZNAS, BPBD and related parties.

Another effort from the government in monitoring and controlling the non-physical environment is the formation of PBM or Community-Based Management within the sub-

district scope but it is rarely active. Whereas PBM is a forum for socialization, counseling, and training from BPBD which is usually held in the sub-districts. Community enthusiasm for disaster mitigation is not seen from the activeness of PBM members. Training usually prioritizes how to save people from drowning or broken bones and others while being practiced.

In his research, Paramesti examines the level of community preparedness using several parameters, including knowledge and attitudes, policies, emergency response plans, disaster warning systems, and resource mobility. The results of his research show that the people who are the object of the study are still in a condition that is not in the middle of facing natural disasters. This is because there are still not many efforts made by the government or other parties. The higher the level of preparedness of stakeholders and the community, the greater the vulnerability to disasters (Hadi, Agustina and Subhani, 2019).

K. Adaptation of Communities in Disaster-Prone Areas.

The community's adaptation to hurricane disasters in particular does not exist due to their lack of knowledge about disaster mitigation and is influenced by their economic situation and the frequency of hurricane disasters is very small when compared to other disasters in their area. There is no explicit prohibition on living in disaster-prone areas, only in the form of notification to the public about vulnerable buildings and being told that the area is disaster-prone. All returned to their respective communities. The government feels that it has no right to prohibit areas where a tornado has occurred because the community has built it on private land/land. The community's contribution is only at the time of the disaster, while before and after the disaster the community contributes less.

Official advice not to live in disaster-prone areas is difficult because most of them build on their own land which is close to their rice fields as well as their business fields. Emergency response efforts that have been carried out for generations have not been in accordance with the standards applied in disaster emergency response. Therefore, increasing public understanding and knowledge about hurricanes, both when they occur, the characteristics of their formation, adaptation and disaster mitigation, needs to be improved (Wibowo, Dewi, Ronggowulan, and Anjarsari, 2020).

The results of interviews with informants who are stakeholders and the community, in Sungai Tabuk Sub-district there is no relocation of community houses that have experienced damage due to hurricanes. The thing that prevents relocation is because the community builds on their own land/land that is not owned by the government, so the government does not feel entitled. The research findings agree with (Armi, Soeaidy, and Hayat, 2012) that the simplest definition of relocation is moving from one location to another, but in its implementation relocation covers various fields including spatial planning, socio-economic dynamics and adaptation to new things that are new. make relocation not easy. Usually the damage caused

by hurricanes in Sungai Tabuk District is in the form of damage to the roof of the house. This finding agrees with (Wazir, 2019) which states that in general, tornadoes have an impact on the roof of the house, causing damage by removing part of the roof of the house.

The research findings that tornadoes in the research area are very local agree with (Wazir, 2019) which states that hurricanes are generally local in nature with a coverage of 5-10 km and a short duration of 3-5 minutes. Tornadoes are actually local in nature in terms of the location of the incident and the impact it has, however, the incident has caused both material and non-material losses (Wibowo, Dewi, Ronggowulan, Anjarsari, 2020)

The appeal for building codes/building regulations is difficult to implement because people adapt their house buildings to the Sungai Tabuk sub-district which is dominated by riverbanks, swamps, and rice fields. In addition, the community also aims to avoid flooding. The research findings are in line with the opinion (Wazir, 2019) which states that stilt houses are generally built with the aim not of wind mitigation but more of flood mitigation. This is in accordance with the adaptation to the swamp environment by the people in Sumatra and Kalimantan. The lack of public knowledge of the data provided by the BMKG has greatly reduced awareness of disasters. This triggers vulnerability to hurricane disasters (Iryanthony, 2006). Therefore,

The government/stakeholder of Banjar Regency raises public awareness by conducting training. The training was carried out during socialization, each sub-district sent a representative to be a disaster management team, each village was represented by 2 people. Training and outreach were not held in all sub-districts and villages, only in disaster-prone areas. The training is in the form of delivering to the community how to evacuate and teaching that the main thing to be saved when a disaster occurs is the loss of life. Socialization and training are carried out in disaster-prone areas such as Lok Buntar village. Lok Buntar Village has been transformed into DESTANA or Disaster Resilient Village. DESTANA has a work structure and program. DESTANA was formed in the village due to frequent natural disasters, not only hurricanes but also other disasters such as floods and fires. In addition to disaster prevention, DESTANA also has a program on how to restore the residents' economy after a disaster occurs.

Disaster Resilient Villages (Destana) are the most important elements of districts/cities as spearheads in measuring and increasing regional capacity related to disaster risk reduction, so it is hoped that research on Disaster Resilient Villages (Destana) will produce a distribution of village ranking index scales in efforts to reduce disaster risk and distribution. region (Shofwan and Nuraini, 2019).

CONCLUSION

Based on the results and discussion, it can be concluded that the efforts of the government and the community regarding hurricane disaster mitigation, both structural mitigation and non-structural mitigation, are still lacking. The government's efforts to prepare mitigation actions, increase public awareness and supervise/control the non-physical environment are quite good, there is counseling and training to the community on disaster management. Disaster mitigation is not optimal in the regions due to the lack of coordination between stakeholders and the community as well as the lack of community enthusiasm for knowledge about disaster mitigation. This is based on research findings that there is unequal distribution of assistance to the community and the lack of information about counseling, socialization, and training to the general public by representatives of each region.

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