

ADAPTATION STRATEGY OF COMMUNITIES FACING COASTAL HAZARD IN SEMARANG COASTAL AREA

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ABSTRACT

Tidal flood is one of the serious threats to the coastal areas. One of the areas in Indonesia which are very vulnerable to tidal flood is Semarang coastal area. Class vulnerability of tidal flood in Semarang coastal area ranges from moderate to high. The phenomenon of tidal flood was perceived by the community is getting worse from year to year. This study aims to assess the adaptation strategy of communities in the Semarang coastal area. The methods used in this research are the field survey, in-depth interview and Focus Group Discussion (FGD). Field survey was conducted to collect data on the condition of research area. In-depth interview was conducted to obtain information from the relevant authorities, namely Regional Disaster Management Agency and Department of Public Work. The data were analyzed descriptively qualitative. The results showed that people in the Semarang coastal area has several strategies to face tidal flood that often occur in the region. Adaptation is performed on residential buildings, availability of clean water, roads, and ponds. Adaptation strategy that has been done is to elevate the building homes, raising the road, make a levee. In addition to plant mangroves around the coastal areas to reduce abrasion.

Key words: Adaptation Strategy, Coastal Area, Coastal Hazard, Tidal Flood.

Introduction

Coastal is an encounter area between land and sea which is heavily influenced by wave, current, and sediment supply from the mainland brought by streams that flow into coastal (Helfinalis 1993). Coastal areas dynamics are very high, especially related to the issue of global warming that has effect on sea level rise (Tu and Nitivattananon, 2011). In the global context, research related to coastal disaster has been done by many scientists in the world, as an example of Nicholls and Mimura (1998), Kobayashi (2003), Mills et al. (2005), Marfai et al (2008).

Flood is the most common disaster in the world (Singh and Devkota, 2015). Flood is one of the impacts of climate change which gives serious threats. Generally, the flood that occur in coastal areas is a combination of various factors. These factors include overflowing river flood, flood from other areas, and tidal flood. Tidal flood is a problem that often occurs in coastal areas. It means that coastal area is an area that is prone to disaster (Marfai and King, 2008a; Marfai *et al.*, 2009). Some coastal areas in Indonesia which is affected by tidal flood are North-Java coastal areas, including Semarang coastal area.

Semarang coastal area is very vulnerable to flood. Whereas, Semarang has high population. According to recent research conducted by Marfai, *et al.* (2008b), class of vulnerabilities to flood in Semarang coastal area is on the range of medium to high. Even tidal flood that occurred this year in Semarang designated as disaster emergency. The flood in Semarang coastal area is occurred due to several factors, including the tide inundation, overflowing rivers, and land subsidence.

Tidal flood that occurs continuously has negative impacts on coastal communities. These negative impacts include the effects of physical, social, economic, and environmental. It cause various adaptation come up in communities. So, adaptation strategy of communities is necessary needed to face tidal flood. Adaptation strategy is an action taken by the community to adapt to various environmental changes that occur in the region due to the threat of disaster (Hardoyo, *et al.*, 2011). Adaptation strategy to face environmental changes can give advantage, for both short time and long time problem solving. Adaptation capability is different

in each area, depends on economy capital, social capital, financial capital, natural resources capital, physical capital, and human capital which are on each area.

The phenomenon of tidal flood was perceived by the community is getting worse from year to year. However, tidal flood can reach 50 cm at the highest tide. This disaster is very injure for community life. Therefore, it is needed various adaptation strategy to decrease negative impact. Based on that explanation above, formulation of the problem that needs to be examined is how adaptation strategy of communities in Semarang coastal area to face tidal flood.

Materials and Methods

This research is located in Semarang coastal area. This area was chosen because it has vulnerable to coastal disasters, especially tidal flood. It is based on various studies as conducted by Marfai and King (2008a); Marfai (2012); and Mardiatno, *et al.*, (2012). Every year, people who live in this area have to face tidal flood. Even the tidal flood is getting worse in every occurrence. Then, the sampling areas are 3 villages, there are Tambakrejo, Tanjungmas, and Mangunharjo. This three areas was chosen by random sampling techniques.

This study uses descriptively qualitative method. The purpose of using qualitative method is to provide information about tidal flood impact, social capital in the communities, adaptation strategies of communities, and government policies related to communities adaptation to face the disaster.

At the stage of field work, the main focus is collecting primary data. The primary data obtained through field surveys, in-depth interview and Focus Group Discussion (FGD). Sampling for indepth interview conduct by purposive sampling. Criteria of selected respondents are the people who are in the research area, the head of household or a person who has grown up, and can provide the required information in the study. In this research, in-depth interviews were conducted to government agencies as stakeholder namely Regional Disaster Management Agency and Public Works Agency. Respondents were involved in the focus group consists of 4 groups, village officials, community groups, teenager, and oldster.

Results and Discussion

Coastal disasters, including tidal flood have big impact for the community. The impact caused the emergence of various forms of adjustment in the community. In other words, adaptation strategy refer to action planning which will do at certain time by community or personal as an adaptation effort (Moran, 1982). Adaptation is one form of public response in addressing environmental change. Adaptation strategies of communities can provide benefits in the settlement of short-term and long-term. Adaptation strategies in each region varies, depending on various factors of each region. In addition to the people directly affected, adaptation according to Miller (2000) in Yogaswara (2011) should also be carried out by public and private institutions that together make adjustments.

According to the narrative of local residents, tidal flood in Semarang coastal area that has happened since 1990 make the community are very familiar with this disaster. The community are familiar with any puddles around the settlement which are seen every day in spite of not happening tidal flood. The emergence of tidal flood was assessed as a result of the very rapid development, which includes the construction of ports, industry, and the presence of the reclamation. Indeed tidal flood had always been there, but since the massive building, then tidal flood happened large and leads to damage. Formerly, the tidal flood can come quickly back into the sea and downs, but now tidal flood happens to be pooled and can not flow back into the sea.

People said, because tidal flood causes junk left due to make their settlement become slum. Tambakrejo Village for example, identical to the slum settlements and poor communities. The community is also faced with the problem of seawater intrusion. The impact is the people lacked clean water, because the intrusion also reach the wells. To overcome these problems the government seeks to provide clean water from the distillation of sea water for its citizens. The venture is already considered good enough by the community.

Other impact is the change in the people's livelihood. Some fishermen turned as employees in the company or the industry as experienced by Tanjungmas villagers. However, changes in livelihood will be assessed as a community adaptation strategies to survive by looking for income to provide for his family.

The Government will undertake the project Kampung Bahari (Maritime Village) in this area. By relying on two aspects: the potential for people working as fishermen and location of village is strategic for being a tourist village. The project is expected to be a positive impact on the environment and society. Tidal flood can be reduced with this project, and the community get additional income without having to change the livelihood. The establishment of this maritime village is a strategy of the government to overcome the tidal flood, at the same time meant that the future can be a community strategy to survive in the midst of this disaster. This is done, for seeing that the strategy undertaken to elevate the building home will require a considerable cost. While the government can not provide assistance on all citizens to elevate the house. So with this project, people are more able to elevate the building home itself because of the economy increased.

Mangunharjo village is one of the villages in Semarang were quite successful in overcoming the problems of tidal flood. With the help of the government was to socialize planting mangrove, people began to realize the importance of protecting the environment. Planting mangrove began in earnest again in this area, not just on the shoreline, but also in the area of the pond. In addition the ponds, which are located considered incompatible with environmental governance is then backfilled for planting

mangrove trees again. The community effort has quite significant impacts. Tidal flood decrease to reach settlements. Puddles in the streets also seen reduced. Until now there are more than three groups of mangrove farmers in this area.

Generally, the impact of abrasion and tidal flood that occurred in Semarang coastal area divided into three types of land use, there are fish ponds, paddy fields and settlements. Various problems in the affected area very disturbing community such as access roads damaged, unproductive paddy fields, land use change, groundwater becomes salty, land subsidence, and garbage. As a result, problems of economic, social, cultural, and health can not be avoided, as shown in Figure 1.

Figure 1: Problem Faced by Communities



(a) Slum Area



(b) Water Pollution Caused by Garbage



(c) Road Which Inundated by Tidal Flood



(d) Homeless



(e) Fish Ponds Damaged



(f) Worship Place Damaged

Economic problems that occurred in Semarang coastal area include the loss of livelihoods for farming, such as in fish pond or paddy field area which inundated by tidal flood so reduced yields and economic decrease. Socio-cultural problems seen in the disruption of community activities, both for the access roads to schools, markets and offices. This occurs due to the water trapped in the village. Health problems also arise, such as groundwater becomes salty and there are slums, so that access to clean water is so necessary.

Community adaptation strategies to cope abrasion and tidal flood, based on the results of FGD divided into three groups, there are the strategy undertaken by individuals or households, the strategy undertaken by the community, and the strategy undertaken by the government. The integration of the strategy implementation in three groups is very intensive to face abrasion and tidal flood. Each group has their respective activities to reduce disaster risks. Communities in Semarang coastal area assume that tidal flood is not a disaster. They have experience and habits living harmony with disaster, so they assume that the tidal flood is "something that come and go". They know that tidal flood is "something which given by God". Even so, the loss of economic aspect is considerable.

Strategies for coping tidal floods performed by individuals and households, such as put the things on high level, elevate the building home, making the levee in front of the house, cleaning the water which inundated around the house, and familiarize themselves with the tidal flood as shown on Figure 2. The strategy at the individuals and households is the first stage in disaster risk reduction. Implementation of the strategy at the level of individuals and households will be successful if the community has a heightened awareness that they are live in prone areas to disaster.

Figure 2: Some of Adaptation Strategies of Communities



(a) Levee in Front of The House



(b) Elevate the Building Home

Strategies for coping tidal floods performed by community, such as elevating the road, clean the gutter, dredge the river, make the special groups, like fishermen's groups and mangroves's group as shown on Figure 3. This activity as a mitigation efforts in a wider area than the household area. Implementation of the strategies at the community level will be successful if every person is willing to participate in disaster risk reduction activities.

Figure 3: Mangrove



(a) Mangrove at Around The Fish Pond



(b) Government Support on Planting Mangrove

Strategies for coping tidal floods by the government are program to build houses, program to elevating the road, and migration for the village that has been severe. Governments have a critical role in disaster mitigation because the government is the leader of the community. The activities to reduce the risk of disaster requires assistance from the government, especially related to fees and policies. Warning system is one of strategy to reduce the impact of tidal flood disaster, shown on Figure 4.

Figure 4: Warning System by Community to Reduce the Impact of Disaster



(a) Don't Throw Your Waste to Channel Stream



(b) One Mangrove for Better Future

Conclusion

People in the Semarang coastal area has several strategies to face tidal flood that often occur in the region. Adaptation is performed on residential buildings, availability of clean water, roads, and ponds. Adaptation strategy that has been done is to elevate the building homes, raising the road, make a levee. In addition to plant mangroves around the coastal areas to reduce abrasion.

Differences variety of adaptation strategies at the individual, household, community, and government linkages to the susceptibility, the vulnerability, social capital and the function of each. The level of susceptibility and vulnerability associated with the potential risk that will be happened. Social capital relates to the ability of human social and economic in the face of the tidal flood. While the function of each (household, community, government) known that disaster risk reduction activities can be effective, efficient, and not overlap.

This research still has limitation, particularly in terms research sampling area because the limitation of time and energy. Hopefully, further research can dig up information broader and deeper.

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