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The Adaptation of The Society in Coping with Tidal Flood in Kemijen Village Semarang City

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Abstract

Tidal flood is a natural phenomenon that often occurs in coastal areas and will be even greater with the increase in sea level due to global warming. Kemijen Village is located in Semarang Timur Sub-District, Semarang City, has a high population density and high slum area. This adds vulnerability to tidal flood, so it is necessary to adapt with tidal flood to reduce the impact. Adaptation is done so that the tidal flood that occurs does not have a more severe impact on the people living in the area. The purpose of this research is to analyze the adaptation of the society in coping with tidal flood in Kemijen Village. This research used a qualitative approach with in-depth research. The results of the research show that the adaptation made by the society to tidal flood is adaptation to the place of residence, adaptation to public facilities and social facilities, and social adaptation. Based on the theory of the level adaptation by Wohlwill it has been known that the adaptation of the society to the place of residence has not reached optimal levels. This research has the aim can be used as input for the development of science in this case related to adaptation in overcoming tidal floods.

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INTRODUCTION

Tidal flood is a natural phenomenon that often occurs and is faced by almost all countries in the world, including Indonesia.. Tidal flooding is high tide, flood, medium tide, or high flooding lowland (Oktavia, 2012). Tidal floods in the future may become larger with the phenomenon of sea level rise due to global warming (Marfai, 2013). Tidal floods caused by the impact of coastal development (Wahyudi, et al. 2012). Tidal flooding will be more severe due to inaccurate use and land management that will threaten the coastal area of Java Island with a length of about 1.000 km and a width of more than 250 km from a total of more than 80.000 km of coastal Indonesia (Kasbullah, 2014). At least 63 districts located along the north and south coast of Java Island with a population of about 74.9 million or 65 percent of the total Javanese population are in danger of coming at any time (Sumintarsih, 2008).

The cause of flood are due to natural factors and human activities (Gunawan, 2010). Human activities that can cause floods, among others, littering and the establishment of buildings on the banks of the river (Marfai, 2013). Therefore, society participation in reducing tidal flood risks is important by raising society awareness and capacity, not only by government agencies, but also by social and individual support.

Semarang City is one of the areas vulnerable to tidal flood, although the tidal flood does not cause casualties, but the need for adaptation and mitigation or reduction of impact on the tidal flood. Adaptation is a recommendation as an adaptation option for global climate change (Theiken, 2016). Adaptation has been done as a form of flood prevention in Semarang City, such as adaptation of renovation done to residential building, and maintenance adaptation which is still in the form of maintenance and not much make changes to environmental condition (Yuliastuti, et al. 2013). Community efforts are made in the face of the tidal flood is to raise the floor of the house and build a house (Hardati, 2011; Roehman, 2014)). Efforts to control the tidal flood in the city of Semarang has not shown significant results, coupled with the habits of people in the city of Semarang throw waste in the river considered to make flood prevention to be in vain (Prabowo, 2015).

Sunarjan (2014) the selection of areas is very important to be done in order to simplify and focus the problem. Semarang Timur Subdistrict in accordance with the direction of the RTRW (Spatial Plan) of Semarang City is a vulnerable area of tidal flood, one of which is Kemijen Village with high population density and high slum area. This adds to the vulnerability to tidal flood, so it is necessary to tidal flood adapt to reduce the impact of tidal flood. Tidal flood has a significant detrimental impact on the societyty, namely damage to physical buildings, loss of livelihoods, and disruption of community activities (Desmawan, 2012; Kusuma, 2016). Kemijen Village, from approximately 1,500 houses scattered in an area of 140, 9 ha, 700 homes are potentially affected by tidal flood (Pribadi, et al. 2011). The presence of high density settlements increases the vulnerability of the Kemijen Village against the tidal flood disaster. Therefore, the need for learning by way of adaptation of the society when the tidal floods as a response of the tidal flooding that occurred.

This research purpose to determine the adaptation of the community in coping with tidal flood in Kemijen Village, Semarang Timur Subdistrict, Semarang City. The benefit of this research is expected to give input in the form of information for Kemijen Village in knowing the condition of society affected by tidal flood. This is related to the adaptation that society undertakes in coping with tidal flood. For the Regional Disaster Management Agency Semarang City can be used as input in coping with tidal flood, especially related to society adaptation.

METHODS

The research approach used is qualitative with in-depth research. The focus of the research is the adaptation of the community in coping with

tidal flood in Kemijen Village. The main informants in this research were community leaders. Technique of collecting data obtained by interview, observation, documentation and literature research. The validity of research data is done by triangulation of source, triangulation theory and method triangulation.

Triangulation of sources is done by comparing data from interviews, written documents and comparing the results of interviews between informants one with other informants. Triangulation theory is done by constructing the theory used in analyzing data obtained from the research. Triangulation method is done by comparing data in different way that is by interview, observation, documentation and literature research. Data analysis technique is done by collecting data, processing and preparing data reduction data, presenting and making conclusion.

RESULTS AND DISCUSSION

The society has a strategy to adjust to its environment. The strategy used is adaptability (Sunarjan, 2017). Adaptation is an adjustment effort made by humans in responding to environmental and social changes. Kemijen Village is a vulnerable area of tidal flood and has dense settlements. Adaptation needs to be done on tidal flood as an effort to survive (Setyowati, 2017). Vulnerability and potential risk of tidal flood can be low due to high adaptive capacity (Yang, et al. 2015). Similarly, what has been done by the Kemijen Village community has adapted to tidal flood.

Adaptation to Residence

Adaptation made by the society to the place of residence is diverse. Adaptation is done to the physical building of the place of residence, and move things so as not to be exposed to a pool of tidal flood to a higher place. The residence is adjusted in such a way as to avoid damage by tidal flood. This adjustment is carried out starting from the floor to the roof of the house.

Adaptation is done on the floor of the house with hoarding, which is to do gradually. Hoarding is carried out by the Kemijen Village society on average between 3 and 6 years with an average height of between 10 and 50 cm.

The society adds the floor to the residence as a form of adaptation. The addition of the floor is not only used to provide comfort to the occupants of the house when there is a tidal flood, but can also be used as a place to secure the items on the ground floor that are affected by a pool of tidal flood. Society that have low dwellings will secure household furniture and valuables in higher places such as cabinets and tables, or attach them to the wall by putting them in crackle bag.

The next adaptation of the place of residence is by making a embankments in front of the door. Some of the embankments are permanently built using cement, some are not permanent using the board. Embankments that are not permanent, can be moved. If are not tidal floded the embankment can be placed near the fence so as not to block the road.

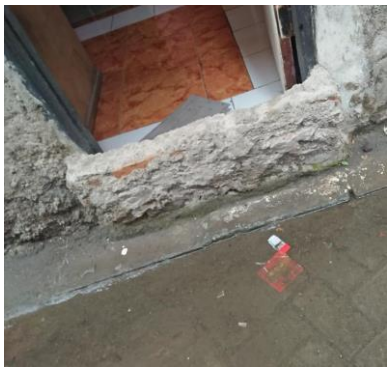

Figure 1. House Embankment

Kemijen Village community made adaptations in coping with tidal floods, it was also done by making a house on stilts. This is supported by Sanjoto's (2016) research that dense settlements that are vulnerable to tidal flood can adapt to holding a stilts house. The stilt house is used as a sampel house for tidal flood resistant. The house has two models. First, the house is made from Kalsiboard asbestos roof, wood flooring, with an area of 3x5 meters, has two floors, the ground floor has one room without bulkhead, while the bed is on the upper floor. The house can be elevated down to prevent incoming

water, free from problems with land subsidence and can adjust the road that is elevated. The house can also adjust the height of the puddle. When there is a puddle, the floor can be elevated, then the water will flow under the floor.

Secondly, the construction of tidal flood resistant house in Kemijen Village is also available with a stilt house model. Kemijen village for stilts house is made using bamboo. This is explained systematically in the Pribadi, et al. (2011) research that stilt houses are a construction system with floors raised from the ground, with the pillars being supported. There is only two sample tidal flood resistant house in Kemijen Village Although it is called as be a sampel house in adaptation to cope with tidal flood, so far no one has imitated the model of this house.

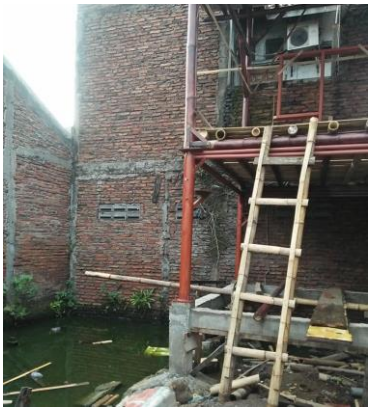

Figure 2. House on Stilts

Adaptation to Public Facilities and Social Facilities

Adaptation made to public facilities and social facilities in the form of physical improvements with the aim can be used properly as well as its function. Sakti (2013) stated that public facilities are facilities that are held for the public interest, while social facilities are facilities held by the government or private parties that can be used by the general public in a residential environment.

Public facilities that are repaired by the society as an effort to adapt to tidal flood are among others roads, waterways, bridges, and waste dump. Roads to adjust to inundation of the tidal flood, elevated. Materials used in road construction are sand, collapsing of buildings materials, land and paving. The use of paving in road construction, has the reason that tidal flood water can seep through the paving cracks so that it can help reduce infiltration. In the research of Nur Human (2011) added that the use of paving block pavement in the a vulnerable area of tidal flood is considered to have a mass that is lighter than the mass of rigid pavement so that the land subsidence can be minimized. This is in accordance with the conditions that occur in Kemijen Village, where the area is vurnurabl to land subsidence. Based on the economic conditions of Kemijen Village, the use of paving blocks is included in the appropriate category because paving blocks are portable so that they can be reused if they are re-done on the road. So it can be concluded that the use of paving blocks can also reduce the costs incurred.

Waste is also used as a basis for road elevation, then stacked with soil and sand. This is done to save costs. However, elevating the road using waste turns out not to have a good impact, because it can cause unpleasant odors and the soil will easily collapse again.

The waterways which is the place where water flows into the river in the implementation of adaptation is done by dredging, construction and cleaning. The effort is carried out by community service, so that the waterways can accommodate more water, because the water channel in Kemijen Village tends to be narrow.

Bridges as links between villages separated by Banger River have been adapted to tidal flood. This adaptation is carried out by the community with development. Development in the form of elevation and cementing on the surface. Elevated is done to avoid overflow of river water so that the bridge can still be passed. In Kemijen village, adaptation to waste dump is done by adding waste dumps and coordinating effectively. The amount of waste that is not managed properly, encourages the society to add waste dump independently.

The adaptation of the society to social facilities such as schools, places of worship, and parks, is generally done uniformly. School buildings are generally made with higher floors of

roads and school grounds. For the part of the field, it was built using paving to avoid muddy floors due to tidal flood, so that when tidal food down can be used immediately.

The park, which also includes social facilities in Kemijen Village, has been adapted by conducting periodic construction and cleaning. Development is carried out by giving paving so that the park is not muddy and when the low tide can be used the surrounding society.

Social Adaptation

Social adaptation, in this case the relationship between people to restore, maintain or achieve the desired conditions in society. Adaptation is carried out in several fields, namely economic, education, religion and social.

The economic field, adaptation is carried out on livelihoods. For industrial workers if there is a tidal flood in the morning, the society will look for other roads that are not badly hit or by wearing sandals, shoes are placed in bags. If tidal flood arrives at dusk, he will wait for tidal flood to subside a little until the road access can be passed smoothly. This behavior has a purpose to reduce the obstacles from tidal flood, so that he can still live his economic life.

The entrepreneurs and sellers who sell at home, there is no specific adaptation to tidal flood. If tidal flood comes, the store will remain open as usual even though there are no buyers. The construction workers if there is a tidal flood, then they will change jobs at other times. This is because construction workers do not have regular scheduled. For this reason, the adaptation process emphasizes the work time that has been targeted.

The education field in the adaptation process is done by continuing to go through tidal flood to go to school. This is done by both students and teachers. Some choose to leave at noon. In this event the teachers in the school had their own understanding of students who did not leave because of tidal flood.

The social field, the actions taken are to replace the day if a meeting or recitation will be held. Although sometimes socialization cannot reach the entire society when it is replaced in another day. But this is not so problematic because usually people already know by themselves, if there is tidal flood will be changed to another time.

The society applies the rules as a form of tidal flood adaptation. The rule are prohibiting littering, community service and rules for turn on water pumps. This rule was created by the society both the government and the society independently. Generally, the rules for prohibiting littering are found in prohibition boards around rivers and ponds. The government sets rules starting from the level of village, hemlet and neighbourhood. The ban boards that are held by the government are generally better than those that are self-supporting which look simpler.

Community service rules are also specified in the tidal flood adaptation. Community service is carried out at the village, hemlet and neighbourhood levels. Community service is carried out in the service of cleaning the environment of waste and building roads and community facilities. Community service at the village level tends to be less frequent because the scope is too broad and the monitoring is not so effective. Whereas community service at hemlet and neighbourhood levels is more often done, especially at the neighbourhood level. For the neihgbourhood level, if there is a head of the household who does not take part in the community service without permission, a fine will be imposed for the neighbourhood cash.

Kemijen village has many water pumps, both those owned at the hemlet, neoghbourhood and individual levels. The rules stipulated in the turn on of the water pump are the large pumps in the Banger River. In this rule there are several people who are assigned to guard and turn on the water pump. The pump can be turned on if the capacity of the tidal flood water that reaches the land reaches a certain capacity. Then if it hasn't reached that capacity then the water pump not be turned on.

Economic and cultural fields, related to waste management and the search for assistance as donors for people who experience many losses. Waste management is carried out by the community together with the PKK (program at

village level to educate women on various aspects of family welfare) and youth organization. Given that the waste in Kemijen Village has not been managed properly, waste management efforts have been carried out. Inorganic waste that can be recycled, made several handicrafts and then sold as additional income such as bags, wallets and pencil cases. Waste management is implemented in the form of Al Hidayah waste bank. The waste bank is an effort that involves the community to care for the environment and as a form of effort to improve the economy.

Waste management can indirectly smoothen waste management. The scattered waste will hamper the flow of water when it recedes. This is consistent with the results of Siregar's (2014) research that waste can increase the impact of tidal flood, because scattered waste will disrupt the flow of water and can interfere with the performance of water pumps that are useful for moving water in residential areas.

Theoretical Analysis of Adaptation Level Based on Wohlwill's Thought

Adaptation for Wohlwill is related to stimulation that occurs in society. Stimulation has a low or high level. Both have negative consequences for behavior. Adaptation practices in Kemijen Village refer to the stimulation in the form of tidal flood. Tidal flood is a phenomenon that comes from nature. Areas affected by high tidal flood can be considered to have high stimulation, whereas areas affected by tidal flood with low altitude are considered to have low stimulation.

Stimulation will be juxtaposed with the processing capacity of the information that has been obtained. In this research the information is the coping of tidal flood. It is said that if the stimulus has a high level, then high information processing capacity will lead to an optimal level of stimulation. The optimal level of stimulation is the one that can achieve optimal behavior (Veitch & Arkkelin, 1995).

The adaptation process requires information first. This information is related to mitigation efforts to adjust the occurrence of tidal flood. The community must continue to live in Kemijen Village which is in line with tidal flood. However, it must also be able to survive with various efforts to minimize the impact of tidal flood.

Physical adaptation includes adaptation to residence, public facilities and social facilities. In connection with Wohlwill's theory of level of adaptation, adaptation to the place of residence of all residents is informed that the effort that must be done is to elevation, both elevated by means of hoarding or by adding to the floor of the house. With stimulation and information, the community has the capacity to adapt.

Kemijen village society in adapting to a place of residence can be called to have not reached the optimal level. The society who live in areas high tidal flood have houses that are not suitable for habitation, it is the condition of slums and low-rise buildings. Often when there is a tidal flood, the surrounding area has receded while the house is still inundated. This is influenced by the economic level as the processing capacity. The people living in the high tidal flood area are people with low economies so they cannot raise their homes. While the road is always elevated, so the water will flow into the house.

Information processing capacity to adapt to Wohlwill's level of adaptation theory in this research is in the form of knowledge and economic level. This has the reason that in order to adjust the place of residence to tidal flood, the place of residence must be carried out by the construction, to do the construction required a cost. When knowledge has been possessed while the economic level is low, it cannot reach optimal processing capacity. When knowledge has been possessed while the economic level is high, it can be said to achieve optimal processing capacity. Optimal capacity must be balanced with optimal stimulation to achieve optimal adaptation levels according to Wohlwill's level adaptation theory.

Adaptation to the place of residence in Kemijen Village including the level of adaptation that is not yet optimal. This is because people who can perform optimal processing capacity, namely people who have information and have a high economic level are people who have low stimulation, meaning that they live in areas that

are affected by low tidal flood. In contrast, people who have low processing capacity live in areas affected by high inundation. For this reason, in the adaptation to the place of residence in Kemijen Village, it can be called that it has not reached an optimal level.

Adaptation for public facilities, the majority is carried out by the government. In general, the level of adaptation has reached an optimal level of adaptation. This is because, when doing an adaptation, consideration has been made first. Public facilities that will be built or often cleaned are public facilities in areas that have high tidal flood. When the government will carry out elevation and development, it will survey the area first and consider its needs.

CONCLUSION

The conclusion of this research is that the community of Kemijen Village has made adaptations in coping with tidal flood. Adaptation is carried out both physically and socially. Physical adaptation is efforts to restore the function of residential buildings, public facilities and social facilities. The adaptation is generally in the form of elevation, cleaning, construction and construction of tidal flood resistant houses. Whereas social adaptation is done by road alternative that are not flooded by tidal flood in living everyday life as accessibility, making waste management rules, carrying out community service, turning on water pumps, utilizing waste, adjusting community activity schedules that are disrupted by tidal flood. Adaptation of residence according to Wohlwill's level of adaptation theory states that adaptation has not reached optimal levels, while adaptation of public facilities, social facilities and social adaptation is at an optimal level.

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