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FACTORS OF COASTAL COMMUNITIES OF SEMARANG RELUCTANCE TO MOVE FROM THE COASTAL AREA (A CASE STUDY OF TANJUNG MAS COMMUNITY IN NORTH SEMARANG REGENCY, SEMARANG CITY)

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ABSTRACT

Tidal flooding is one of many disasters caused by climate change. Semarang is one of coastal areas that is affected by climate change which brings tidal flooding in some coastal communities especially Tanjung Mas community in North Semarang. The flood is driven by sea level rise and subsidence. Tidal flooding distrupts the communities of Tanjung Mas in term of physical destruction and enviromental destruction. The disruptions are also affecting both their social and economic activities. The secondary data were collected by doing survey in some instutions who already had the data about tidal flooding. After the data were analyzed by using SPSS with cross tabulation analysis, it shows that the period of residency is ($X^2_{calculate}$) 26,543 > (X^2_{table}) with statistical significance 5%:11,070. Meanwhile, the level of education is ($X^2_{calculate}$) 42,285 > (X^2_{table}) with statistical significance in 5% : 9,487. The livelihood is ($X^2_{calculate}$) 17,616 > (X^2_{table}) with statistical significance in 5% : 9,487. The level of income is ($X^2_{calculate}$) 22,196 > (X^2_{table}) with statistical significance in 5% : 9,487. The level of knowledge is ($X^2_{calculate}$) 13, 328 > (X^2_{table}) with statistical significance in 5% : 9,488. Those results show that the five factors are the cause of Tanjung Mas community's reluctance to move from the coastal area and to stay in this tidal risk area.

Keywords: *Tidal Flooding, Reluctant to Move, Sea Level Rise, Subsidence*

A. INTRODUCTION

The climate change as an important issue for international world has given many negative impacts for many activities on this earth. The impacts include flooded coastal areas and sinking of small islands due to sea level rise, tropical storms, huge wave hit and tidal flooding, Overexploitation-induced land subsidence typically covers a wide area and occurs with a time delay after initiation of the groundwater-level decline (Salehi Moteahd et al., 2019) as well as treats for the human safety due to increasing intensity of tropical storm (UNFCCC Secretariat, 2007). According to (Kuehn et al., 2001), The groundwater head decline due to overpumping is high in the city of Semarang chiefly situated over alluvial deposits. The area underlain by the volcanic rocks of the Damar formation is clearly not affected by this phenomenon.susceptibility is a condition where the defence against external factors is getting decreased that may threaten the life, works, natural resources, infrastructure, economic

productivity, and welfare. One of the main issues is the growth of human population settling in the coastal areas. In 2000, the human population has reached the number of 6 billion people, and more than half of them live in the coastal areas. More than 50 percent people of developed countries live in more than 60 km from the coastal areas, while those in the developing countries are more concentrated on urbanization and industrial growth located in the coastal areas (Haslet, Simon, 2000). In general, the sea level rise is the most obvious impact of global warming that occurs in all parts of this earth. (Nishijima & Kazama, 2015) further explained that meteorological or hydrometeorological disasters are closely related with the climate.

These kinds of disasters do not commonly occur on certain places although there are some which experience dry season or the tropical storms (cyclones, hurricanes, or typhoons), or seasonal flood generally occur on certain areas. The meteorological disasters like dryness and flood are the most common ones occurring around the world. However, local people often neglect or do not yet completely know the implications or the risks of those natural disasters for their life. According to IPCC (International Panel On Climate Change) the average of the earth temperature has increased for 0,3 – 0,6ºC since the end of 19th century, and until 2100, the earth temperature is estimated to rise approximately 1,4 - 5,8ºC. The rise of global temperature causes iceberg melting in north and south poles which leads to the sea level rise. It is estimated that from 1999-2010 the sea level has risen for about 1,4 - 5,8 m (Bakr, 2015).

The coastal areas of Semarang city is predicted to sink due to the sea level rise in 2029 as high as 16 cm with the area coverage of 2672,2 Ha, has unique geographical characteristics where the Semarang area is divided into two namely the lowlands in the north and the highlands high in the south. Semarang area section north is a lowland located in The north coast of Java Island (Azeriansyah et al., 2019). The tidal flooding in Semarang is getting more serious with the subsidence that plays an important role in the tidal flooding expansion. The subsidence is a natural phenomenon which is caused by clogged weak ground (Marfai & King, 2007).

An important factor that must be analyzed in mitigation efforts is the assessment of areal susceptibility toward upcoming disasters. The susceptibility is shown by identifying the impacts of the disasters, in term of number of causalities or short-term economic loss consisting of damage of settlement infrastructure, facilities and other buildings, as well as long-term economic loss in form of disruptions of economic activities and other natural resources damages. The

susceptibility analysis is more focused on physical, social, economic, and environmental conditions of the local communities (Abidin et al., 2013). Land subsidence is not a new phenomenon for Semarang, which has experienced it for more than 100 years. The impact of land subsidence in Semarang can be seen in several forms, such as the wider expansion of (coastal) flooding areas, cracking of buildings and infrastructure, and increased inland sea water intrusion.

The occurrence of the tidal flooding raises huge impacts on the conditions of surrounding communities, particularly for those who live in the coastal areas. The assessment of communities' susceptibility toward certain disasters is a very important component in the assessment of disaster risks besides the assessment of natural danger. The communities' susceptibility is basically dynamics in relation with the social conditions of the communities that also dynamically change in the contexts of time and space o (Esteban et al., 2019) . Therefore, a true identification for those who are susceptible with certain natural disasters periodically is the most important part in the disaster relief system (Buckle dkk, 2001).

Based on the research background and formulation of the problems, the general research objective is to assess the factors causing the reluctance of coastal communities of Semarang city particularly in Tanjung Mas community in North Semarang sub district to move and their pretension to stay in the tidal flooding areas.

B. MATERIALS AND METHODS

This research aims to identify the factors causing the reluctance of coastal communities in North Semarang sub district to move from di wilayah tidal flooding areas in their living place, and it uses qualitative analysis technique. (Wainger, 2017) defined the qualitative approach as an inquiry process to identify social or human issues based on the creation of holistic imageries in form of words, to report informants' views in detail and prepared within a scientific background. In the qualitative method, the research questions do not only include: what, who, where, when, and how, but the most important is they must cover the question "why". The "why" demands answers about the essence contained between symptoms or concepts. The qualitative research method covers security and interview techniques with guidelines (Soedarsono & Hariawan, 2017).

To obtain optimum results in this research and to identify the factors causing the reluctance of the communities in Tanjung Mas village of North Semarang sub district, the analysis results are compared or connected using quantitative

and qualitative methods to find whether there are similarities of reasons why they are reluctant to move away, improve attitude people who care about Environment for personal safety family. This is because of attitude society will be very decisive significant in improving preparedness in doing disaster. Therefore needed recovery, outreach, seminars, collaboration that involves public and private companies too institutions / institutions to be together contribute to improving mindfulness in truly behaving caring and deep attitude facing disaster.

Objects are the problems to be studied. The research objects are the factors that determine the communities of Tanjung Mas village in tidal flooding areas to stay there. data collection and analysis in this research is:

1. Data Collection Methods

a) Types and Source of data

Primary data are the data which can be directly collected observed on the field (observation) and documentation. The primary data in this research are collected by survey technique using structured interview in form of list of questions distributed to the respondent and semi-structured interview guideline for key informants. The secondary data are obtained from various sources, like Department of Ocean and Fisheries of Central Java, Regional Development Planning Agency of Semarang City, National Agency for Disaster Relief of Central Java, Central Bureau of Statistics of Semarang city, and village office of Tanjung Mas. The types of the secondary data are activities report, research report, archive, documentation and others related with the research problems. The secondary data are used to support the primary ones that can give beneficial information to understand and clarify the research problems.

b) Sampling Method

The sampling method used in this research is purposive sampling which is applied during the interview toward the respondents.

c) Determination of Respondents

The respondents are determined using random sampling technique, where each individual in the population in this case is the head of family has the same possibilities to be selected (Creswell, 2013). The analysis unit of this research is the head of family spread out in the Tanjung Mas village of North Semarang sub district. The determination of sample size uses the formulation of Taro Yamane (Azhar et al., 2020) as follows:

$$n = \frac{N}{Nd^2+1}$$

Note:

n = sample size

N = number of population

d = predetermined precision value (10%)

The population used as the sample are all the heads of families in Tanjung Mas village which is located on the tidal flooding area. The sample taken for this research is the number of the heads of families. Tanjung Mas village consists of 7511 heads of families and those who are impacted with the tidal flooding are 2452 (Data taken from Monography of Tanjung Mas village in 2013). The criteria of the respondents that are taken as the sample is the heads of families living in the research area impacted with the tidal flooding. The data of the population are then calculated for the number of sample required in this research using the following formulation:

$$\text{n} = \frac{2452}{2452.(0{,}1)^2 + 1}$$

Using the formulation above, the number of respondents impacted with the tidal flooding are 2452 heads of families with the margin of error 10% (d = 0,1), and the samples taken are 97 respondents.

d) Determination of Informants

This research uses purposive sampling in determining the informants. It is done by taking subjects not based on level, random or area, but according to specific purposes. In this research, the selected informants are competent people (individuals) in term of the occurrence of tidal flood in the research area. The purposive sampling applied in this research is used to find the information related with social conditions of the communities including their understanding on kinship.

2. Data collection techniques

Data are a number of information that can describe certain conditions and classified based on the data homogeneity (Prakarsa, 2006). The data collection means systematic and standard procedure to obtain required data (Nazir, 2001) . The research done by the writers is a field research, i.e. a research done by directly involved to the research objects. The d collection techniques used for this research are:

a) Primary Data Collection Techniques

The primary data are collected through primary surveys by conducting interview and direct observation on the field.

1) Interview

The interview is conducted through direct or face-to-face meeting between the researchers and the respondents, where they are interviewed according to the research objectives.

2) Observation

This technique is used to collect the data through the observation and data recording shown in the research objects

b) Secondary Data Collection Techniques

The secondary data collection is done before ini conducting the survey to obtain the primary ones. The secondary data collection is conducted by taking necessary information from stastistical data according to the research variables.

1) Documentation

Documents are the records/notes of certain events. The documents can be in form of writings, pictures, or monumental works of an individual. The examples of written documents are daily notes, life histories, stories, biography, rules, and policies.

2) Survey of Instances

The survey is done to obtain necessary data from related instances. They include the office of North Semarang sub district, Department of Ocean and Fisheries of Central Java, Regional Development Planning Agency of Semarang City, National Agency for Disaster Relief of Central Java, Central Bureau of Statistics of Semarang city, and village office of Tanjung Mas. The data required are physical conditions of coastal areas in North Semarang sub district, socio-economic conditions, environmental conditions, and regional infrastructure.

3. Data Analysis Methods

The correlation between two variables can be seen from the values of Chi-square from the analysis of *crosstab*; if there is no correlation, then the variables are independent or freedom, exactly statistically free, and vice versa (Mchugh, 2013).

C. RESULTS AND DISCUSSION

General Descriptions of Tanjung Mas village

Tanjung Mas village is located on North Semarang sub district, covering 323,782 Ha area consisting of 271,782 Ha dried are (yards/buildings) and 52 Ha wet area (embankment). Tanjung Mas is one of the villages located in North Semarang sub district. This village has high-density of

activities because it has high value of accessibility, located on strategic place, near with centre of activities, city centre, and transportation centre.

Figure 1. Map of Research Location

Uses of Areas

Tanjung Mas village has 397,39 Ha area, and 323,782 Ha of it is the area of Tanjung Mas port together with its surrounding binding areas. Those areas have specific functions as Tanjung Mas port, container houses, industries, storehouses, office complex, trading places, railway station, and retaining basin (in front of Tawang railway station). Those conditions describe that this area is dominated with urban activities on the coastal area, so that there is no chance for areas extension for rice fields (Areal Planning of Semarang city, 2009). The uses of areas in Tanjung Mas village are presented in the table 1.

Table 1. The uses of areas in Tanjung Mas village

No	Use of Areas	Width (Ha)	Percentage (%)
1	Yards and buildings	303,24	76,31
2	Other dried areas	43,94	11,06
3	Ponds/embankments	50,21	12,63
	Width Total	397,39	100

Source: North Semarang sub district in figure, 2013

Socio-Economic Conditions

1. Demography

Tanjung Mas village consists of 126 neighbourhood associations (RT) and 16 RW (groups of RTs) with the number of inhabitants as many as 27.490 people divided into 7561 families. The occupations of the people of Tanjung Mas village include fishermen, entrepreneurs, industrial workers, builders, traders, transportation, civil officers, armies, pensioners and other services, and most of them work as the industrial workers.

Table 2. Number of People of Tanjung Mas Village based on Occupations

No	Occupation	Number (People)	Percentage (%)
1	Fishermen	2345	15,55
2	Industries/handicraft	12	0,08
3	Entrepreneurs	11	0,07
4	Transportation	278	1,84
5	Industrial Workers	5287	35,06
6	Builders	4107	27,24
7	Traders	560	3,71
8	Civil Officers/Armies	921	6,11
9	Pensioners	361	2,39
10	Other services	1196	7,93
	Total	**15078**	**100**

Source: North Semarang sub district in figure, 2013

2. Settlement Activities

The research is conducted in a settlement located in the coastal area of Semarang city which is divided into fishermen and urban settlements, namely (Areal and Regional Planning of Semarang city, 2009):

a) Fishermen settlement

This kind of settlement is developed on the coastal area of Semarang. The typical characteristic of this settlement area is the existence of TPI and PPI as well as located in estuaries of Semarang city. The distribution of this settlement is so limited compared with the urban area. Besides, the spatial development is also bordered by coastal morphology and distribution of industrial activities.

b) Urban Settlement

Along with the development and growth of Semarang city, there are also centres of settlements in the coastal areas of Semarang. They are developed along with the existence of trading centres. On their development, these settlements are more concentrated on coastal sub

district areas in Semarang or around reclamation areas of Marina beach.

c) Economic Activity

There are various economic activities in Tanjung Mas village recorded in North Semarang sub district in Figure 2016. The economic activities in Tanjung Mas village are further described in Table 3 below.

Table 3. Economic Means of Tanjung Mas Village 2013

No	Economic Activities	Number (Units)
1	Markets	2
2	Shops/stalls	94
3	Hotel/inn	2
4	Cooperatives	1
5	Big/medium industries	50
6	Small industries	27
7	Home industries	14
	Total	**190**

Source: North Semarang in Figure 2017

In line with the areal planning of Semarang city, the coastal area in Tanjung Mas village has progressively developed its economic activities in industrial, trading and services fields. Here, the industrial activities are the most dominant ones. This fact is enforced by the Regional Areal Planning, which states that the primary function of this area is for the development of industrial activities. Meanwhile, the fishery which is originally and initially the basic economic activity tends to be more decreased along with the development of existing urban activities. Many activities developed in this coastal area can be more explained in detail as follows (RTRW Kota Semarang, 2009).

d) Industrial

The industrial activities are getting more developed due to the existence of primary artery track of Semarang city and its flexible accessibility in distributing the goods through the sea or the air. The industrial development in this coastal area is more dominant than the fishery.

e) Trading and Services

The trading activities which are now more developed in the coastal area are intended as a part of transportation supports. It is also actually related with the developing industrial activities, while the developing services activities include industrial offices and other services which can support the industrial activities.

Figure 2. Built environment in the research area

Communities Adaptation Strategies

The anticipation toward the natural disasters, particularly tidal flooding, can be done through certain adaptation methods. Vayda dan McCay (1978) applied adaptive strategic concept as a response done by an individual or groups, or can be defined as an adjustment form toward changes of natural conditions or risks that may occur. The adaptation can be done by heightening the buildings or houses. Therefore, someone who has done some necessary adaptations can possibly survive and stay at the locations which are susceptible for tidal flooding attack. It is like the respondents of Tanjung Mas village who decide to stay in the tidal flooding area. The composition of the respondents who have and have not yet anticipated the tidal flooding threat can be seen in Table 1.

Tabel 4. Respondents' Anticipation toward Tidal Flooding

No	Preparing anticipation	Number	Percentage (%)
1	Yes	59	60,8
2	No	38	39,2
	Total	**97**	**100**

Source: Analysis Results (2016)

From Table 4.17, there are 59 respondents or 60,8% who have prepared some anticipations to reduce the impacts of the tidal flooding in their area, while 38 respondents or 39,2% confess that they do nothing to anticipate the tidal flooding

attack.,With the occurrence of land subsidence and tidal level rise, an important anticipation that should be done by the communities is to heighten or fill out their buildings and ground. The heightening process can be done based on their own economic conditions. Massive growth is threatening the sustainability of cities and the quality of city life.

Mass urbanisation can lead to social instability, undermining the capacity of cities to be environmentally sustainable and economically successful It is in line with the statement (Riffat et al., 2016) that the human tends to choose adaptive activities in facing their environmental issues and situational uncertainties. The adaptation efforts are significantly influenced by the economic conditions. For the people with good economic life, commonly they will heighten their yards and buildings as height as approximately 1,5 meters, while for those who do not have enough money, they will do it gradually by only preventing the tidal rise not to enter their houses. Table 1.6 shows that most f the respondents decide to heightening house foundation i.e. 49 respondents or 48,51%, then 20 respondents or 19,8% have anticipated the tidal flooding by building houses on stilts, and 11 respondents or 10,89% build terraced houses.

Table 5. Forms of Respondents' Anticipation toward Tidal Flooding

No	Forms of Anticipation	Number	Percentage (%)
1	Building houses on stilts	20	19,80
2	Heightening the houses	49	48,51
3	Building terraced houses	11	10,89
4	No anticipation	19	18,81
	Total	**97**	**100**

Source: analysis results (2017)

Results of Crosstab Statistical Tests

In the quantitative analysis method, all susceptibility variables, history of the settlement and the communities' anticipation in reducing the impacts of the tidal flooding will be statistically tested using *crosstab* analysis to identify what factors that determine their reluctance to move from the tidal flooding area and to identify if there are any correlations between the analyzed variables and the reluctance of the communities to move. The correlations between those two variables can be seen from the values of Chi-square as the results of *crosstab* analysis.

Table 6. Results of Crosstab Statistical Tests

No	Variable	$(X^2_{calculate})$	(X^2_{table})
1	Correlation between the respondents' duration of staying and their pretension to stay	**26,543**	**11,070**
2	Correlation between the respondents' original ethnic and their pretension to stay	**0,227**	**4,761**
3	Correlation between the respondents' ownership status and their pretension to stay	**2,965**	**4,761**
4	Correlation between the respondents' educational level and their pretension to stay	**42,285**	**9,488**
5	Correlation between the respondents' social bond and their pretension to stay	**0,599**	**3,841**
6	Correlation between the respondents' knowledge on the tidal flooding and their pretension to stay	**13,328**	**9,487**
7	Correlation between the respondents' social interaction and their pretension to stay	**8,431**	**9,488**
8	Correlation between the respondents' occupations and their pretension to stay	**17,616**	**9,487**
9	Correlation between the respondents' income and their pretension to stay	**22,146**	**9,487**
10	Correlation between the respondents' work places and their pretension to stay	**1,101**	**3,841**
11	Correlation between the respondents' types of houses and thei pretension to stay	**5,669**	**4,761**

Synthesis of Analysis

The purposes of the analysis toward various variables like duration of living, origin of ethnic, year of house building, origin of house ownership, ownership status, respondents' anticipation, educational level, social bond, respondents' knowledge, social interaction, communities' attitudes, occupations, income, work places and types of houses owned by the respondents with the respondents' pretension to stay is to identify whether those variables are correlated or are the determinant factors that cause the people choose to stay in the tidal flooding area in Tanjung Mas village, North Semarang sub district of Semarang city. The analysis of the correlations between the variables and the respondents' pretension to stay at their living places is conducted both quantitatively and qualitatively. The statistical result of each variable is presented in table 1.6 below:

Table 7. The Results of Analysis Synthesis of Each Variable

No	Analysis	Result
I	Analysis of the respondents' characteristics and their staying histories with their pretension to stay:	
	1. Analysis of the respondents' duration of staying with their pretension to stay	Correlated
	2. Analysis of the respondents' origin of ethnic with their pretension to stay	No Correlation
	Analysis of the respondents' ownership status with their pretension to stay	No Correlation
II	Analysis of the respondents' anticipation efforts with their pretension to stay	Correlated
III	Analysis of susceptibility factors with the respondents' pretension to stay	
	1. Analysis of the respondents' educational level with their pretension to stay	Correlated
	2. Analysis of the respondents' social bond with their pretension to stay	No Correlation
	3. Analysis of the respondents' knowledge on the tidal flooding with their pretension to stay	Correlated
	4. Analysis of the respondents' social interaction with their pretension to stay	No Correlation
	5. Analysis of the respondents' occupations with their pretension to stay	Correlated
	6. Analysis of the respondents' income with their pretension to stay	Correlated
	7. Analysis of the respondents' work places with their pretension to stay	No Correlation
	8. Analysis of the respondents' types of houses with their pretension to stay	No Correlation

D. CONCLUSIONS

From the respondents' staying characteristics and histories, there has been a strong bond between them and their living places, so that it is very difficult to them to move to other locations, and it is their main reason why they choose to stay in their houses although they are included in the tidal flooding risk area. From the susceptibility factors, the social factors which include educational level, social interaction, knowledge on the tidal flooding, and economic conditions like occupations and income, are the most dominant factors which influence the respondents' pretension to stay in their living places although they are included in the tidal flooding risk area. The main reasons why the communities decide to stay in where they are living are: Lack of education and skills that make them have no choice for other jobs outside of their living places, so that they decide to work on anything that is near their houses. Those who have stayed for quite a long time feel that their

current houses are the best environment for them to live in. Their properties, including land and buildings, do not have high selling values, so that if they are sold to others, the people still do not yet get enough money to buy the new properties outside of the flooding areas. For those who decide to leave their properties (in this case are houses), absolutely they have considered all important aspects particularly their financial one, thus they will certainly be able to build or buy new houses in much safer places late.

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