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# Disaster Literacy for Dealing with Tidal Floods (Rob) in Tanjung Mas Village North Semarang District, Semarang City

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## ABSTRACT

Semarang is one of the areas in Central Java that is often affected by tidal floods. Tanjung Mas Village, North Semarang Subdistrict, experiences threats to tidal floods in the high, medium and low categories, but 89.63% of its area experiences high threats to tidal floods. The aims of the research were (1) to find out the community's readiness in dealing with tidal floods (rob), (2) to find out the form of disaster literacy in the community in dealing with tidal floods (rob). This research is quantitative research. The research population is the head of the family who lives in the tidal flood affected area of Tanjung Mas Village. The sample used purposive sampling technique, obtained a sample of 39 households residing in RW 14 to RW 16. Data analysis technique using descriptive percentage. The results showed that community readiness in dealing with tidal floods was good, community readiness in the form of (1) providing an understanding of tidal conditions to family members, (2) introducing rescue efforts, (3) prioritizing items that must be saved, (4) coordinating with related parties such as PMI, village head, Karangtaruna / rescue team, (5) understanding early warning systems, (6) planning evacuation needs or staying at home during emergency conditions, (7) increase the height of the house building. The form of literacy in the tidal-affected area of Tanjung Mas Village is interactive and communicative disaster literacy. Quantitatively, the form of basic disaster literacy is 84%, functional disaster literacy is 85%, communicative & interactive disaster 86%, critical disaster literacy 85%.

***Keywords:*** Disaster Literacy, Readiness, Rob, Tidal floods.

## INTRODUCTION

The very high potential in coastal areas brings cultural development and concentration of development, urban development and human activities centered and concentrated in the area (Marfai, 2014). Although it can provide positive potential for certain fields, coastal areas are also vulnerable to problems. Problems that occur in coastal areas are caused by threats that occur from land and processes that occur from the ocean. One of the problems in coastal areas that often occurs is tidal floods (rob). Semarang City is one of the areas in Central Java that is often affected by rob. The coastal area of Semarang has a gentle topography with a slope of 0-2% (Bappeda, 2016). Coastal areas are highly vulnerable to the impacts of flooding and tidal flooding due to climate change. North Semarang Sub-district is one of the places in Semarang City that is often affected by tidal floods (rob). There are 6 out of 16 sub-districts in Semarang City that are included in the coastal area, including Genuk Sub-district, Gayamsari Sub-district, West Semarang Sub-district, North Semarang Sub-district, and Tugu Sub- district, as well as East Semarang Sub-district (Putra & Handayani, 2013: 786-796). Tanjung Mas Village, North Semarang Subdistrict, experiences

high, medium and low threat of tidal flooding, but 89.63% of its area experiences high threat of tidal flooding. The vulnerability of the area to tidal flooding is in the high category, while the community's capacity to deal with tidal flooding is in the low category. Kelurahan Tanjung Mas experiences subsidence of more than 8 cm per year. As a result of the height of the tide being higher than the land surface, the lower area experiences inundation during high tide (rob) (Gultom, et al, 2018: 199). The Head of Tanjung Mas Village, Mr. M. Josep Joko, S.Pd., when interviewed said that the areas in Tanjung Mas Village that were severely affected by rob were the residential areas of Tambak Mulya, Tambak Lorok, and Tambak Rejo which are RW 12 to RW 16.

Given the condition of the Tanjung Mas Village area which has the potential threat of tidal floods (rob), the community in the Tanjung Mas Village area needs to improve their preparedness for the tidal phenomenon. Disaster literacy as a community awareness effort in dealing with a disaster is very important for the community to have. Disaster literacy is a keyword that must be understood by the community so that they fully understand (literacy-aware) that the geographical location of their country is in a disaster-prone area (Afrian & Zukya, 2019: 135). Brown, et al (2014) divided the disaster literacy model into 4 levels, namely, (1) basic disaster literacy, (2) functional disaster literacy, (3) communicative and interactive disaster literacy, and (4) critical disaster literacy. The community seems to have prepared for the tidal floods that have become a regular occurrence in their area, therefore the community is already in the process of disaster literacy itself. The community seems to be at a certain level of disaster literacy with the adaptations they made.

The problem of this research is that the community understands that their area is affected by tidal waves, but they seem helpless by continuing to inhabit the area with various efforts made, one of which is literacy. The aims of the research were (1) to find out the community's readiness in dealing with tidal floods (rob), (2) to find out the form of disaster literacy in the community in dealing with tidal floods (rob).

## LITERATURE REVIEW

Literacy can provide individuals with the opportunity to learn and gain a number of skills, referenced from Bicar, et al (2017:49). It not only improves communication skills but also "provides access to knowledge and builds the confidence and self-esteem needed to make decisions". Disaster literacy is defined as an individual's ability to read, understand and use information to make informed decisions and follow instructions in the context of mitigating, preparing for, responding to and recovering from disasters (Brown, et al 2014).

Readiness is the overall condition of a person that makes him ready to respond in a certain way to certain situations (Slameto, 2003). Tidal flooding is an event caused by global sea level rise. The existence of high and low tides will affect the inundation conditions that occur. This phenomenon presents flooding caused by sea level rise, which is called tidal flooding. The tidal inundation area at the highest tide will increase and extend inland according to the elevation of the land surface or the morphology of the coastal land. There are two parameters of tidal inundation, namely tides and land elevation (Asrofi, et al., 2017).

## MATERIALS & METHODS

The population in this research were heads of households in Tanjung Mas Village in the tidal flood-affected areas, namely RW 14 to RW 16, with a total population of 775 households. This research sample determination used *purposive sampling* technique, by selecting the heads of families (KK) in the RT areas affected by tidal floods in RW 14 to RW 16.

**Table 1. Total population and research sample**

| No. | RW | RT | Total Population | SampleQuantity |
|---|---|---|---|---|
| 1. | 14 | 9 | 88 | 4 |
| 2. | 14 | 10 | 76 | 4 |
| 3. | 15 | 3 | 171 | 9 |
| 4. | 15 | 4 | 108 | 5 |
| 5. | 16 | 3 | 93 | 5 |
| 6. | 16 | 4 | 93 | 5 |
| 7. | 16 | 5 | 146 | 7 |

Source: Monographic Data of Tanjung Mas Village, 2022

Based on Table 1. Households affected by tidal floods are those in certain RTs in RW 14 to RW 16. RW 14 has 2 RTs, RW 15 has 2 RTs, and RW 16 has 3 RTs. The selection is based on locations that have a moderate to high tidal threat index. The sample size in this research is 5%, due to the homogeneous of the data and to be more specific (see Table 1).

The variables in this research are disaster readiness and literacy. Data collection techniques in this research used 1) Interviews, aimed at residents as a source of information who can provide information through oral media. This interview method was aimed at a number of 39 families in RW 14 to RW 16 in Tanjung Mas Village. 2) Observation, which was conducted to obtain an overview of the environmental and community conditions affected by tidal floods in Kelurahan Tanjung Mas. 3) Documentation, in the form of several documents which include the monograph of Tanjung Mas Village. 4) Questionnaire, in the form of a list of questions to find out the community's readiness in dealing with tidal floods and disaster literacy that has been applied by the community in dealing with tidal floods.

This research is a quantitative study using descriptive percentage data analysis techniques. Community disaster literacy was measured using a test with 30 multiple choice questions with four alternative answers. The score used on the test is 1 for the correct answer and 0 if the answer is wrong, the calculation is assisted using Microsoft Excel and using a formula which then the calculation results are interpreted with a sentence. The formula used in descriptive percentage analysis (DP) is as follows.

$$DP = \frac{n}{N} \times 100\%$$

Description
DP = descriptive percentage (%)
n = empirical score (score obtained)
N = ideal score for each question item

## RESULT AND DISCUSSION

### Community Readiness for Dealing with Tidal Floods

Tanjung Mas is located in the coastal area of Semarang City and borders several other sub-districts in North Semarang District. Coastal areas such as Tanjung Mas Village cause the phenomenon of tidal flooding in the area. However, not all areas in Tanjung Mas Village are affected by tidal flooding, only areas that are directly adjacent to the sea experienced tidal flooding.

According to the people who have become respondents in this study, tidal waves occur every day. The time of occurrence is in the morning and evening according to the tide. The duration of the inundation itself is 1 - 3 hours. However, some houses can be inundated for more than that time. One respondent, named Mrs. Diah, for example, the back of her house (kitchen) can be inundated for up to 24 hours because the back of her house has a lower ground level.

The community readiness referred to in this research is the condition of the community that makes it ready to respond to certain situations. Community readiness in this research is based on the service standards for family readiness in facing disasters. The following readiness of the Tanjung Mas

community to face tidal floods is presented in tabular form (Table 2).

**Table. 2 Community Readiness in Facing Rob in Kelurahan Tanjung Mas**

| No. | Forms of Community Readiness | Description of Community ReadinessEfforts |
|---|---|---|
| 1. | Educate family members about theconditions that may occur due to rob. | Parents explained to their children not to approach the area that borders the sea during a rob. Children are aware of their home environment and have the understanding tohelp secure their belongings and clean up theirhome environment after the tide recedes. |
| 2. | Introduce rescue efforts for emergency conditions. | The head of the family directs his family members to save their belongings and stay at home. |
| 3. | Prioritize items that to besalvaged. | The community secures important documents into bagsor keep them safe into the closet. |
| 4. | Coordinate with related parties in dealing with tidal floods (PMI, Village Head, Youth Organization/rescue team) | Socialization and provision of assistance is carried out by several parties, such as PMI, Village Head, Youth Organization/rescue team in coordination with residents affectedby tidal floods. who are its members. |
| 5. | Understanding early warning systems | The use of kentongan as a sign of emergency conditions when the tide is rising and the weather is bad. Some respondents received *broadcast* message via *whatsapp*. |
| 6. | Plan for what is needed when evacuating or staying at home. | There is no planning for evacuation needs by the community, but they have planned to go toa safe place or a relative's house if conditions occur emergency. |
| 7. | Increase the height of the house. | Community has do increase the height of the house foundation due to thewater level. The sea is getting higher and higher. |

**Source: Research analysis data, April 2022**

One respondent is a member of PMI, Ms. Suntiah, who coordinates with PMI to conduct socialization and assistance for the community (Figure 1).


**Figure 1. Provision of basic food assistance by PMI (Source: Research, 2022)**

The provision of assistance by several parties for the Tanjung Mas Village area does tend to be concentrated in the area of affected by tidal floods. One of the early warning systems used in Kelurahan Tanjung Mas is Kentongan, which is sounded when the tide is rising and the weather is bad (Figure 2).

**Figure 2. The use of kentongan as a traditional early warning system**

**(Source: Research, 2022)**

Planning for evacuation is carried out by the community by planning to go to a safe place or to relatives. Evacuation and evacuation shelters are prepared by relevant parties to minimize casualties during emergencies (Figure 3).

**Figure 3. Evacuation sites during an emergency (Source: Research, 2022)**

Evacuation shelters are prepared for people who do not have a place to go during an emergency. Related parties such as BPBD prepare evacuation sites and aid distribution. Another readiness to deal with tidal flooding by the people of Kelurahan Tanjung Mas is increase the height of the house foundation (Figure 4).

**Figure 4. The foundation of the house is higher than the ground.**
**(Source: Research, 2022)**

Rob that occurred in the research location area has been a long time ago, many respondents said that rob occurred since they settled and lived in the area, in the 1990s, but the rob conditions are getting worse at this time, there are houses that are submerged and finally abandoned by their owners because of the rob that is increasingly eating land, but some fishermen families who have economic limitations choose to build makeshift houses in a location that is not much different, this makes the community adapt by making the floor of their house quite high from the ground.

**Figure 5. Respondents drowned houses**
**(Source: Research, 2022)**

In early 2020, there was a high tidal wave, the location that was inundated was around Tambakrejo Street under the flyover (Figure 6), because the ground surface was lower than the sea level so that road access was disrupted.


**Figure 6. Land surface lower than sea level**
**(Source: Research, 2022)**

When the tidal wave started to rise, people were still doing their usual activities, many housewives and their children stayed at home waiting for the water to recede, but if the wind was strong and the sea waves were getting higher, they began to secure their belongings and fishermen were off to sea. After the tidal wave receded, people whose houses were submerged immediately cleaned up because the sea water that entered caused the floor of the house to become slippery.

## Community Disaster Literacy in Tanjung Mas Village

Lisa M. Brown and Jolie Haun (2014) define disaster literacy as an individual's ability to read, understand, and use information to make informed decisions and follow through.

instructions in the context of mitigating, preparing for, responding to, and recovering from disasters. Then divide the disaster literacy model into 4 levels, namely (1) basic disaster literacy, (2) functional disaster literacy, (3) communicative & interactive disaster literacy, (4) critical disaster literacy (Brown, et al 2014).

In this study, community disaster literacy was measured using a 30-item test

multiple choice questions with four alternative answers. The score used in the test is 1 for the correct answer and 0 if the answer is wrong. The questions contained in the test questions cover 4 levels in disaster literacy. The research results in the form of disaster literacy percentage are presented in the form of a diagram (Figure 7).

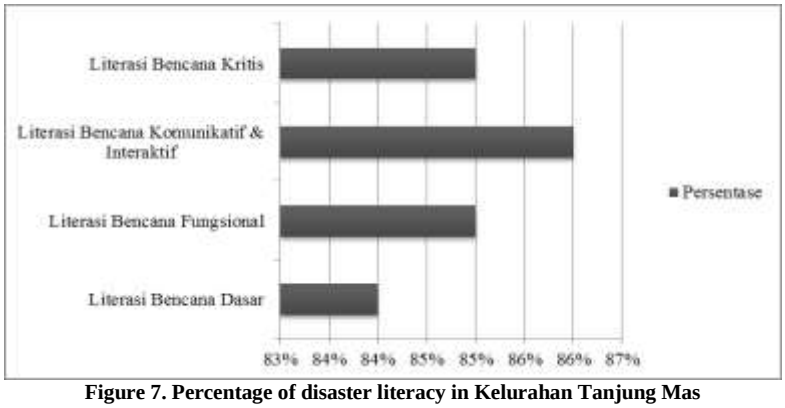


**Figure 7. Percentage of disaster literacy in Kelurahan Tanjung Mas (Source: Research, 2022)**

Based on the diagram above, basic disaster literacy shows 84%, functional disaster literacy 85%, communicative and interactive disaster literacy 86%, and critical disaster literacy 84%. The highest percentage is found in the third level of disaster literacy, namely communicative and interactive disaster literacy. At the interactive and communicative disaster literacy level, the community is more advanced in using skills to seek help and manage their experiences related to tidal floods, besides that the community has been able to analyze information related to tidal floods and take personal control to stay safe when tidal floods occur including overcoming the impact that occurs and restoring the situation as before tidal floods occur. The people of Kelurahan Tanjung Mas are accustomed to the tidal phenomenon, those whose houses are affected by the tidal flow will manage the situation to stay safe, such as not placing electronic goods in low places and will immediately clean the home environment when the tidal recedes. The percentage of disaster literacy for each RW of the research sample will be displayed in a diagram (Figure 8).

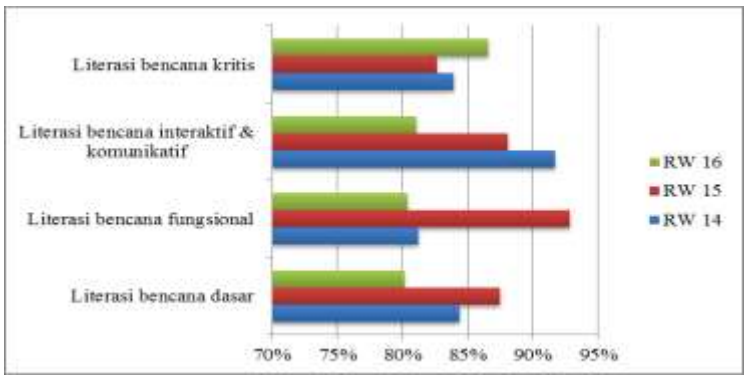


**Figure 8. Disaster literacy per RW (Source: Research, 2022)**

The percentage of disaster literacy for each RW of the research sample reached above 80%. In basic disaster literacy, RW 14 is 84%, RW 15 is 88% and RW 16 is 80%. In functional disaster literacy, RW 14 is 81%, RW 15 is 93%, and RW 16 is 80%. In interactive and communicative disaster literacy, RW 14 is 92%, RW 15 is 88%, and RW 16 is 81%. In critical disaster literacy,

RW 14 is 84%, RW 15 is 83%, and RW 16 is 87%.

**Basic Disaster Literacy,** Basic disaster literacy in Tanjung Mas Village shows a percentage of 84%, this percentage is lower than the other three levels of disaster literacy. In basic disaster literacy, people still miss the opportunity to understand the basics of dealing with disasters. This ability includes the ability of individuals to read and understand disaster instructions. For example, there are still 12.82% of respondents who do not understand the meaning of the gathering point signboard during an emergency. Regarding the tidal threat map, 16.66% of respondents were unable to read and understand it.

**Functional disaster literacy** shows 85%. The people of Tanjung Mas Village already understand and follow efforts towards disaster preparedness, such as preparing themselves when they get broadcast messages about higher tidal waves, securing important documents, as well as securing electronic goods and preparing information on safe places to go during emergencies. As many as 10.25% of respondents still do not know the safe storage of important documents, because they are still not aware of the emergency conditions that may occur. There are 20.51% of respondents who do not know the early warning system in Tanjung Mas Village in the form of broadcast messages via WhatsApp.

**Interactive and Communicative Disaster Literacy,** Interactive and communicative disaster literacy in Tanjung Mas Village reached 86%, this is the highest level of disaster literacy, this shows that people who already have skills and are involved in finding assistance and are able to sustainably manage conditions when rob occurs so that they are able to provide assistance a sense of security for themselves. Communities that have received information related to tidal floods, make them more prepared to face emergency conditions. The community already knows where the source of information related to tidal floods can be obtained.

**Critical Disaster Literacy,** At the critical disaster literacy level, the percentage is 85%. The community understands what to do in dealing with emergency tidal conditions, for example the initial action to cut off the electricity when the tidal wave rises to prevent other disasters such as fire. As many as 76.92% of respondents have prepared a destination to a safer place during emergency conditions, for example heading to a relative's house.
The community is accustomed to dealing with tidal floods in their daily lives, when the tide is high the community is able to secure themselves and do their activities as usual, but children are encouraged not to play in the area adjacent to the sea, then after the tidal floods recede, they can clean the home environment. This happens routinely almost every day in the community in dealing with tidal floods.

## CONCLUSION

Based on the results of research and discussion about Disaster Literacy to dealing with Rob in Tanjung Mas Village, it can be concluded that the community's readiness to face rob is good, community readiness in the form of (1) providing an understanding of rob conditions to family members, (2) introducing rescue efforts, (3) prioritize items that must be saved, (4) coordinate with related parties such as PMI, village head, Karangtaruna/rescue team, (5) understand early warning systems, (6) plan evacuation needs or stay at home during emergency conditions, (7) increase the height of the house. The form of literacy in the tidal- affected area of Tanjung Mas Village is interactive and communicative disaster literacy. Quantitatively, basic disaster literacy is 84%, functional disaster literacy is 85%, communicative & interactive disaster literacy is 86%, critical disaster literacy is 85%.

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