Analysis of the level of community resilience to tidal flood disaster in Banyuwangi Village, Manyar District, Gresik, East Java

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ABSTRACT

Banyuwangi Village is a coastal area located in Manyar District, Gresik, East Java covering an area of 417.3982 Ha. The village has a population of 2239 people. This study aims to assess the level of community resilience affected by the tidal flood in Banyuwangi Village, Manyar District, Gresik Regency particularly in four dimensions i.e. social dimension, economic dimension, preparedness dimension, and physical dimension. The level of community resilience to tidal floods is analyzed through the Resilience Radar. Each aspect of each dimension is then analyzed to calculate the aggregate resilience index in a value range between 0.00 – 1.00. The results of the research found that the element with highest average value is the economic dimension (0.375) and the element with lowest average value is the social dimension (0.075). In aggregate, communities in Banyuwangi Village have a low level of resilience in facing flood tidal disasters.

Keywords: community resilience, Resilience Radar, tidal flood

INTRODUCTION

Disaster is a series of events that threaten and disrupt people's daily lives and livelihoods caused by several factors, i.e. natural and non-natural factors, which can also be caused by humans themselves resulting in widespread losses such as loss of life, environmental damage, loss of property and other impacts [1]. Based on Law No. 24 of 2007 concerning disaster management, disaster has the meaning of events that can threaten and disrupt the life and survival of the population originating from natural factors, non-natural factors, and human factors which result in the emergence of casualties from humans and nature, and disruption of a number of materials and psychological disorders [2].

Natural disasters are a series of events caused by nature in the form of volcanic eruptions, tsunamis, floods, landslides and hurricanes. In particular, tidal floods are catastrophic events caused by rising sea levels at high tide. Tidal floods cause submerged settlements, ponds and warehouses in coastal areas [2] and can also cause various environmental problems. Tidal floods are a threat to residents around the coast because they can cause losses from damage to infrastructure, as well as social and economic aspects of the community.

The causes of tidal floods are the high frequency and intensity of rainfall, climate change, and higher floods from other areas [3]. Floods generally cause water on land to overflow and create puddles. Climate change has an impact on a faster rate of evaporation due to an increase in the earth's temperature and humidity. On a regional scale, excess heat and humidity can cause powerful tropical cyclones. Precipitation tends to increase especially in coastal areas and along the path of tropical cyclones. In Southeast Asia and surrounding areas where typhoons and cyclones often occur, rain tends to be heavy. This climatic phenomenon can also trigger extreme waves [4].

The coast is a transitional area that limits land and sea. Therefore, the coastal area is also a land area that is still influenced by the sea, especially the influence of sea tides which are also the boundary for brackish water ecosystems and the occurrence of river sedimentation is one proof that the influence of land to sea is also still dominant. Coastal areas have a lot of potential that causes an increase in land use or function experts, such as: ports, capture fisheries, aquaculture, tourism, and even settlements. With this potential, it can be said that land use or conversion in coastal areas often creates complex problems caused by both nature and humans [5].

Gresik Regency has an area of 1,194 km² with a population of approximately 1.3 million people with a density of 1,000 people/km² and has 18 sub-districts and consists of 330 villages and 26 sub-districts. Gresik Regency is a lowland with a height of 2-12 meters above sea level. Topographical conditions in Gresik Regency vary at a slope of 0-2%, 3-15%, and 16-40% and more than 40%. Most of those with a slope of 0-2% have an area of 94,613.00 Ha or around 80.59%, while areas that have a slope of more than 40% have an area of 1,072.23 Ha or around 0.91%.

Part of Gresik Regency is a coastal area that stretches from Kebomas District to Sangkapura District, therefore, this coastal area has a high level of vulnerability to tidal floods. Based on an article from detik.com, Banyuwangi Village is an area that is prone to tidal floods, which can even occur up to two times in one year. To be precise, in June, the tidal flood disaster reached about 50 cm. The large amount of land being reclaimed for ponds and factories and even ports has resulted in an increase in

tidal flood inundation from year to year, and the absence of embankments makes tidal flooding less manageable.

Disaster management efforts need to be carried out to create community resilience to disasters as well as to prepare local communities for disasters. Community resilience, usually referred to as social resilience, is the ability of a group or community to overcome external pressures and disturbances that arise as a result of social, political and environmental changes. Meanwhile, resilience is a capacity in a social system that aims to absorb disturbances and reorganize when experiencing change so that it can maintain function, structure, identity, and input, in other words, remain unchanged on the basis of attractiveness [6]

The research conducted aims to examine the level of resilience of village communities in facing tidal floods in Banyuwangi Village, Manyar District, Gresik Regency. The result of this analysis is expected to be a reference and material for the formulation of strategies to increase community resilience in the face of the tidal flood in Banyuwangi Village. So, it can reduce the impact of damage caused by the tidal flood in Banyuwangi Village.

METHODS
Research Location

This research was conducted in the coastal area of Gresik Regency, East Java Province (Figure-1). Gresik Regency is one of the North Coast regions of East Java. Geographically, Gresik Regency is located at 112º - 113º East Longitude and 7º - 8º South Latitude with a land area of 1,193.76 km2. The administrative boundaries of Gresik Regency cover the Java Sea to the north, Madura Strait Regency to the east, Sidoarjo Regency to the south, and Lamongan Regency to the west.
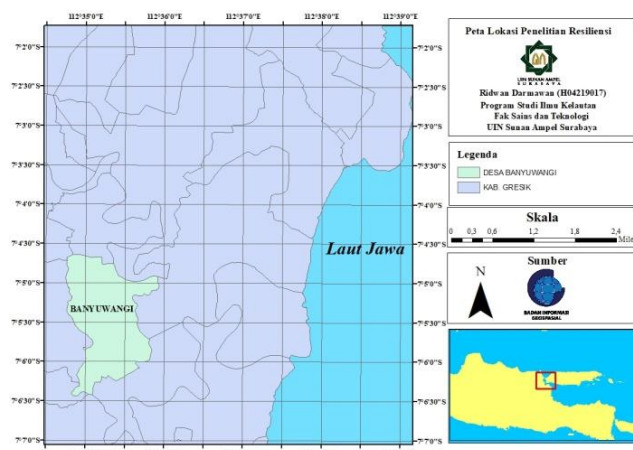

Figure-1. Research sites

Data Analysis Method

The research method used in this study is a quantitative descriptive research method with a case study approach. Quantitative research methods are studies that use the assumptions of a positivist approach. Quantitative methods emphasize numerical data, in which the results obtained are the required variables, that are processed using statistical methods [7-10]. Meanwhile, quantitative descriptive is used to analyze data by describing the data that has been collected as it is without intending to make general conclusions or generalizations. The analysis obtained is also in the form of accumulation of basic data

in the form of descriptions [11]. Descriptive analysis is used to show the relationship between the results in assessing the level of community resilience.

Furthermore, the level of community resilience to tidal floods is analyzed through the Resilience Radar. The analysis in this research was carried out in stages per aspect, per dimension (including economic, social, preparedness and physical dimensions) to calculate the aggregate resilience index. The assessment in this analysis uses the Resilience Radar index with the provision that the score index is given in a value range between 0.00 – 1.00. A value of 0.00 is given to the lowest resistance value and a value of 1.00 is given to the highest resistance value [12]. The average results of the scores for all dimensions are then interpreted into levels of resilience with a resilience range of very high, high, medium, low and very low. The index score and resilience interpretation based on the Resilience Radar can be seen in Table-1. Then, the data obtained were analyzed descriptively to describe the results of the research and the existing conditions [13] and narrated based on the data equipped with references from similar research.

Table-1. Resilience Radar Index

Index Score	Interpretation of Resilience Levels
0.81 – 1.00	Very high
0.61 – 0.80	High
0.41 – 0.60	Medium
0.21 – 0.40	Low
0.00 – 0.20	Very low

RESULTS AND DISCUSSIONS

The coast of Gresik Regency is one of the areas that is a frequent area for tidal floods. The cause of the tidal flood disaster in the coastal area of Gresik Regency is caused by rising sea levels from year to year. In addition, the cause of the tidal flood disaster is the conversion of coastal mangrove areas into ponds and into factories and ports [14]. This was a factor in the tidal flood disaster in June 2022 in Banyuwangi Village, Gresik Regency, East Java, as quoted from the online news site detik.com where the tidal flood lasted for up to five days.

Profile of Respondents

In this study, the number of respondents was taken using purposive random sampling. Based on the results of calculations using the Slovin formula, the number of respondents was 30 respondents. Based on the results of the research that has been done, the results of the overall profile of the respondents are as follows:

Based on the results of the questionnaire to the respondents, there are three vulnerable ages from 0 to 53 years old, i.e. one respondent with a vulnerable age of 0 to 18 years; 17 respondents aged 19 to 35 years; and 11 respondents with a vulnerable age of 36 to 53 years (Figure-2).

Furthermore, there are three categories of educational level of the respondents, i.e. from junior high school to bachelor's degree, seven respondents with junior high school education; 18 respondents with high school education and four respondents with undergraduate education (Figure-3).
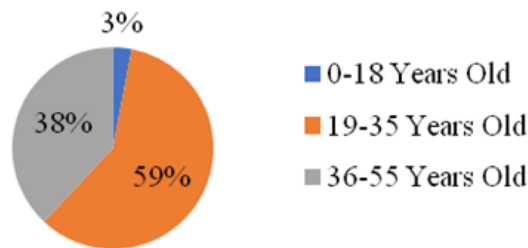
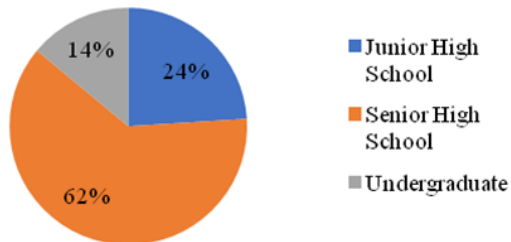**Figure-2.** Respondent categories based on age

Figure-3. Respondent categories based on education level

Viewed from the profession, it is known that based on the results of the questionnaire to the respondents, there are four categories, i.e. employees, not working, traders and the private sector. It was found that four respondents worked as employees, seven respondents did not work, four respondents worked as swordsmen and 14 respondents worked as private (Figure-4).
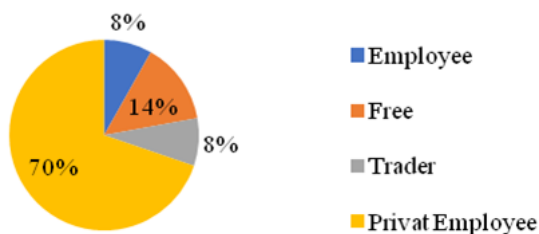

Figure-4. Respondent categories based on profession

Community Resilience Level Analysis

The results of research that has been conducted regarding the level of community resilience in Banyuwangi village, Manyar District, Gresik Regency, East Java. The data obtained comes from the results of interviews, questionnaires, and documentation of the situation in the Banyuwangi Village area and then the data is processed to determine the resilience index value of each dimension as shown in the Figure-5. The resilience diagram has the aim of knowing the high and low levels of resilience possessed by the community.

Based on the calculation results obtained in the Figure-5, it is known that the social dimension is worth 0.075 included in the low category, while for the economic dimension it is worth 0.375 included in the low category, on the preparedness dimension of the people of Banyuwangi Village it has a value of 0.216 and is included in the low category and the physical dimension has the value of 0.233 is included in the low category. The explanation regarding each element of community resilience in Banyuwangi Village is as follows:
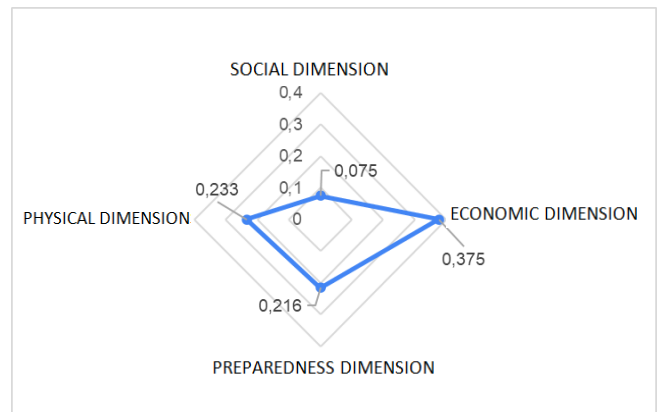

Figure-5. Banyuwangi Village community resilience

Social Dimension

Based on the results of data calculations carried out, it was found that the level of resilience of the people of Banyuwangi Village in the social dimension was included in the low category with a resilience index value of 0.075 (Figure-5). There are five aspects that are used as a reference to get a value for the level of community resilience in terms of the social dimension, i.e. (1) health insurance, (2) education, (3) length of stay, (4) age (regarding the role of the community in the area during tidal floods) and (5) public awareness about health insurance. The results show that the people living in Banyuwangi Village have a low social dimension of resilience in the tidal flood disaster because many people are not aware that health insurance has an important role for health protection. In other indicators, it was found that the community had lived in the area for more than 20 years. The average educational indicator for the people of Banyuwangi Village has an education level of junior high school to bachelor degree so that they have good reasoning to deal with tidal floods.

The social dimension indicators in this research are different from research by [15], which in their research measured community resilience. The difference is that in this study the social variables analyzed only used indicators of relationships within the family and indicators of social interactions/relationships, so it only looked at the relationship between individuals and their families and communities.

Economic Dimension

The level of community resilience in the economic dimension in Banyuwangi Village was included in the low category with a resilience index value of 0.375 (Figure-5). This dimension has two aspects, i.e. profession and the impact of tidal floods on the economy. It was found that the majority of Banyuwangi Village people have jobs that are not at risk when tidal floods come. So that the income that is felt is sufficient to meet daily needs and does not have savings in times of famine.

In this dimension there are the same indicators as in the research of [16], namely the impact of disasters on financial conditions with the justification that the impact of disasters on financial conditions is used to see how much the impact of the disaster is able to make society able to survive in the face of disasters. Meanwhile, several

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different indicators are income and savings. Income and savings can indicate the income held in the household.

Preparedness Dimension

The level of community resilience in the preparedness dimension in Banyuwangi Village was included in the low category with a resilience index value of 0.216 (Figure-5). This dimension has three aspects, i.e. (1) understanding of tidal floods, (2) government assistance, and (3) pre-post disaster simulation activities from the government. The people of Banyuwangi Village have a pretty good understanding of tidal floods, but assistance from government agencies is very inadequate so that the level of resilience is low.

In terms of preparedness, this research also strengthens the research of [17] which examined flood disaster management in Barabai District based on the community's perception, that there is still a lack of socialization and training from the government to the community as part of alert readiness before a flood disaster.

The level of community resilience in the physical dimension in Banyuwangi Village was included in the low category with a resilience index value of 0.233 (Figure-5). This dimension has two aspects, i.e. building materials for residents and government facilities. The Banyuwangi Village community has a place to live that meets the criteria for a place to live in an area prone to tidal floods but the facilities and evacuation carried out by the government are not available and inadequate so that the level of resilience is low.

This result is different from research [12] which shows that the physical capacity (infrastructure) of residential communities in flood-prone areas in Barabai District is low. The condition of the building materials of the houses occupied by households is mostly made of wood or boards. These building materials tend to be easily damaged, especially if they experience frequent flooding. Apart from that, the location of residential areas that are close to rivers also makes these areas vulnerable to flooding, especially households that are very close to rivers can experience flooding more than once a year. This is because if a large river overflows onto land, residential areas on the side of the river are the first areas to be affected by flood inundation.

CONCLUSIONS

The community of Banyuwangi Village in Manyar District, Gresik, East Java has a fairly average level of community resilience at low parameters. The dimension that has the highest average score is the economic dimension (0.375). while the dimension that has the lowest average score is the social dimension (0.075). Therefore, it is necessary to increase all aspects or indicators in each dimension, especially in indicators related to the government because there are no facilities provided by the government to deal with tidal floods.

The index value cannot fully describe conditions in the field because the value is influenced by the weight and score for each parameter and indicator given. Apart from that, this is also influenced by the socio-economic conditions of society in several regions which of course have differences.

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