

The Influence of Geographical Conditions on Flood Disasters in Tunggul Irang Ilir Village

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ABSTRACT

Natural disasters such as floods can be caused by both natural and non-natural factors, such as human activities. The convergence of human activities, static environmental conditions, and dynamic natural phenomena can result in flooding. Static natural elements (topography, rivers, and geographical conditions) and dynamic natural factors (rainfall, tidal currents, land subsidence, and river sedimentation) are the causes of flooding disasters. Tunggul Irang Ilir Village is a village located in the Martapura District of Banjar Regency that experiences flooding every year. It is known that the floods in Tunggul Irang Ilir Village involve several factors, primarily due to the village's geographic conditions, making the area prone to flooding disasters. Therefore, research is conducted on the geographical conditions' impact on flooding in Tunggul Irang Ilir Village to understand the village's geographical conditions and their influence on the floods that occur annually. Using a qualitative descriptive research method, data is collected through documentation, interviews, and observation. Data analysis involves stages such as data reduction, data presentation, conclusion drawing, and verification. This research employs data triangulation, technique triangulation, and time triangulation to test validity. The results of the research indicate that geographic conditions, including the village's location, climate, weather, low land topography, and Martapura River overflow, are factors causing floods in Tunggul Irang Ilir Village.

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1. INTRODUCTION

Flood can be defined as a situation where a land area is inundated by a large volume of water. Flood disasters are characterized by a high frequency and vulnerability level. According to Ramli as cited in

Aditama (2023), a flood is described as the inundation of a region with a significant volume of water. This scenario is caused by the overflow of water in rivers and lakes, exacerbated by heavy rainfall and the accumulation of waste in the river basin area. If the water intensity reaches residential areas used by humans as settlements, villages, and urban areas, it can result in a major flood (Aditama, 2023).

The occurrence of floods and the disasters they cause can be attributed to natural events or human activities that impact the environment and natural resources. Therefore, it can be said that floods result from the convergence of dynamic natural phenomena, static environmental conditions, and human actions. Several factors contribute to flood disasters, including topography, precipitation, tidal currents, river sedimentation, land subsidence, and human activities (such as deforestation and intervention in floodplain development); both static and dynamic natural factors (geographic conditions, topography, and river channels) play a role (Irwan, 2018).

In Indonesia, floods are a common natural disaster (Sari, 2016). Banjar Regency in South Kalimantan is one of the locations that frequently experiences flooding. According to information from the Regional Disaster Management Agency (BPBD) of Banjar Regency, as of February and March 2023, a total of 17,257 houses involving 19,428 households in seven sub-districts and 99 villages were submerged, affecting a total of 65,784 people. Several sub-districts in Banjar Regency experienced significant damage due to the floods, including Cintapuri (169 houses), Karang Intan (236 houses), Martapura Barat (2,227 houses), Sungai Tabuk (2,502 houses), Astambul (3,043 houses), Martapura Timur (3,771 houses), and Martapura Sub-District (5,309 houses) (Rizal, 2023).

From the data of the Regional Disaster Management Agency (BPBD) of Banjar Regency, the aforementioned areas are prone to the impact of flood disasters, and Martapura Sub-District is identified as the area with the largest number of affected houses as of February-March 2023. One of the villages that is frequently affected by floods and is considered a flood-prone area every year is Tunggul Irang Ilir Village. Based on observations and interviews with the local community and village government, Tunggul Irang Ilir Village is one of the villages in Martapura Sub-District, Banjar Regency, that experiences flooding annually during the rainy season. Flooding in this village follows a yearly cycle with varying water levels, ranging from low to moderate to high (Aniah et al., 2024).

The floods that occur in Tunggul Irang Ilir Village are caused by several factors, primarily including the village's physical conditions, high rainfall intensity, runoff from higher areas, and the overflowing of the Martapura River. Given these conditions, a study is conducted regarding the geographical factors influencing flood disasters in Tunggul Irang Ilir Village to understand the village's geographical conditions and their impact on the annual floods in the area. The benefits of this research include providing both the community and local government with a better understanding of the natural conditions, including the geographical features of the village, which contribute to the occurrence of flood disasters in Tunggul Irang Ilir Village. This information can be considered in minimizing the risk of floods in Tunggul Irang Ilir Village.

2. METHODS

The methodology employed in this research is qualitative descriptive. This method involves qualitative or inductive data analysis, with research findings generated through qualitative techniques that prioritize meaning over generalization (Sugiyono, 2019). The qualitative research applied in this study aims to observe and describe the geographical factors contributing to flood disasters in Tunggul Irang Ilir Village, Martapura Sub-District, Banjar Regency. In addition to observation, qualitative research is also intended to understand the data from a standpoint of factual and objective affirmation encountered in the field. The research was conducted in Tunggul Irang Ilir Village, encompassing all neighborhoods (Rukun Tetangga or RT), namely RT.01, RT.02, and RT.03, in Martapura Sub-District, Banjar Regency, South Kalimantan. Data collection was carried out through qualitative descriptive research techniques, including documentation, interviews, and observations. Data reduction, data presentation, conclusion,

and verification are steps in data analysis. The research employs data triangulation, technique triangulation, and time triangulation to test validity.

3. FINDINGS AND DISCUSSION

One of the types of disasters that occur annually is flooding. In Tunggul Irang Ilir Village, floods happen every year during the rainy season. According to the data on Flood-Affected Villages and Subdistricts in Martapura Sub-District, Banjar Regency for the year 2023, out of a total of 26 villages/subdistricts in Martapura Sub-District, 21 are vulnerable to flood disasters, including Tunggul Irang Ilir Village. The floods that inundate Tunggul Irang Ilir Village are reported to last for more than 1 month, and in some cases, even up to three months each year, affecting all neighborhoods (Rukun Tetangga or RT) in Tunggul Irang Ilir Village.

Flooding itself is one type of disaster that can be caused by natural forces (natural) and human influence (community management of the environment and nature). Essentially, the geographical conditions of an area also contribute to the vulnerability of flooding in that region (Government Regulation Number 21 of 2008). The intensity, distribution, frequency, and duration of rainfall are examples of geographical conditions that naturally contribute to the occurrence of flood disasters. Additionally, geographical elements that increase the likelihood of runoff include terrain, hydrology, and the impact of land use changes on river flow characteristics about changes in conservation areas (Afdhalia & Oktariza, 2019).

The main factors causing flooding in Tunggul Irang Ilir Village, one of the main causes, are the physical conditions or geographical factors of the area. These include climate or rainfall factors, topography, and rivers that can no longer accommodate the volume of water.

a) Climate

Climate refers to the habitual weather patterns and characteristics in a particular region. Rainfall patterns will vary due to climate change, which can have negative impacts, such as unpredictable rainfall. This phenomenon is also evident in many floods in Banjar Regency, including Tunggul Irang Ilir Village. Based on interviews with residents, floods in Tunggul Irang Ilir Village occur when there is high rainfall, and the amount of rainfall determines the extent of water entering residential areas. If the rainfall is high, the water level in the village will rise. This statement is also confirmed by the Regional Disaster Management Agency (BPBD) of Banjar Regency, stating that the flood risk in Banjar Regency increases during the rainy season characterized by high rainfall.

According to the 2022 data from the Regional Disaster Management Agency (BPBD), the amount of rainfall in a location is determined by the terrain, climate, as well as the rotation and convergence of air currents. In Banjar Regency, the recorded rainfall in 2017 averaged 215.2 mm, with the highest rainfall occurring in March (482.7 mm) and the lowest in August (30.1 mm). The average number of rainy days is 17, with January having the most rainy days (28 days) and August having the fewest rainy days (5 days).

According to the data from the Badan Meteorologi, Klimatologi, dan Geofisika (BMKG) in the Contingency Planning for Floods by the Regional Disaster Management Agency (BPBD) of Banjar Regency (2022), the potential for floods in 2022-2023 is as follows: In general, the potential for floods in Banjar Regency can occur at any time. The common impact of floods is river flooding. Due to the high rainfall, there is more water than the water distribution infrastructure (rivers and channels) can handle, resulting in water overflow and causing flood disasters, especially in areas near river environments (Maulidi & Cahyadi, 2024).

Floods fundamentally occur due to various factors, both natural and human-induced (non-natural). As mentioned in the National Disaster Management Agency (Bakornas PB) report in 2007, floods can be classified into several types based on their water sources. One category includes floods resulting from excessive rainfall that exceeds the capacity of the water distribution system, encompassing natural river

systems and artificial drainage systems. This is also the case with floods in Banjar Regency, including those in Tunggul Irang Ilir Village. In general, various factors, including climate, influencing excessive rainfall, contribute to the occurrence of floods in this region.

Therefore, it can be concluded that high rainfall is one of the causes of continuous flooding in Tunggul Irang Ilir Village. This is further compounded by the water drainage systems in Tunggul Irang Ilir Village, including the Martapura River and the Kali Mati River, which are unable to accommodate the water capacity, resulting in water overflow and triggering flood disasters. According to statements from the local community, floods in Tunggul Irang Ilir Village typically occur from January to March. Examining the BPBD data mentioned above, aligns with the fact that during these months, the average rainfall tends to increase or is relatively high.

b) Topography

The elevation of the land in the Banjar region is reported to range from 0 to 1,878 meters above sea level. Within the entire area of Banjar Regency, there are specific regions with lower land topography compared to others. This statement has been confirmed by the Regional Disaster Management Agency (BPBD) of Banjar Regency. From interviews, it is revealed that Banjar Regency is a highland area, but its land topography is uneven, making it prone to flooding.

Similar to the land topography in Tunggul Irang Ilir Village, findings from joint research with relevant authorities reveal that the village has uneven land topography. The areas leading to the Martapura River are flatter compared to the areas around the main road. Therefore, this becomes one of the contributing factors to Tunggul Irang Ilir Village being prone to annual flooding in the Martapura sub-district. The natural conditions, exacerbated by inadequate drainage systems (both natural and artificial), make this village susceptible to flood disasters during the rainy season with high rainfall intensity. The lack of water infiltration, insufficient drainage systems, and the overflow of the Martapura River are the main factors making the area vulnerable to floods (Amanda, et. al., 2024).

It can be concluded that Tunggul Irang Ilir Village is indeed a flood-prone area due to several factors, including the physical characteristics of the region such as uneven land topography, coupled with inadequate water drainage or drainage systems. Consequently, every year during the rainy season, the village experiences flooding with varying water levels depending on the intensity of rainfall in that particular year. This statement aligns with the confirmation from the BPBD of Banjar Regency, acknowledging that the Martapura sub-district is frequently affected by floods. The floods are mainly caused by runoff, attributed to the lower land topography in the area. The runoff comes from upstream areas or higher regions (Holilah et al., 2024) .

From these findings, it can be concluded that land topography influences the susceptibility to flooding in Tunggul Irang Ilir Village. This claim is supported by the research of Musfida et al. (2021), explaining that runoff water naturally flows to lower areas due to the nature of water moving towards lower locations, which is one of the elements causing floods. This is also evident in Tunggul Irang Ilir Village, where one of the contributing factors to its vulnerability to flood disasters is the low-lying topography of the village. Tunggul Irang Ilir Village is situated not far from the Martapura River, and the areas leading to the Martapura River are flatter compared to the areas around the main road. Therefore, the topography of the land is one of the factors contributing to why Tunggul Irang Ilir Village is a flood-prone area in the Martapura sub-district every year.

c) Terrain

Tunggul Irang Ilir Village is located not far from the drainage area of the Martapura River. The Martapura River is a tributary of the Barito River, originating in Banjar Regency and flowing into the city of Banjarmasin (Sudarningsih, 2021). Due to the village's natural landscape, which includes the Martapura River, it becomes one of the factors contributing to flooding in Tunggul Irang Ilir Village.

This statement aligns with the sentiments of the local community and is supported by data and statements from the Regional Disaster Management Agency (BPBD) of Banjar Regency. The location of Tunggul Irang Ilir Village within the Martapura River watershed makes it vulnerable to flood disasters. The Martapura River itself has two branches, namely Riam Kiwa and Riam Kanan. The issue of flooding originates from the catchment area, which is the river, experiencing sedimentation, making it unable to efficiently accommodate rainwater when it rains. Even light rain can pose a flood risk due to the overflow of rainwater into the river. This situation is exacerbated by changes in land use from forests to plantations, agricultural land, or residential areas. The conversion of land use results in a lack of absorption areas for rainwater, leading to surface runoff (Cahya et al., 2024).

The catchment area in Tunggul Irang Ilir is the Martapura River. According to Azwarman (2020), a land area that is topographically surrounded by mountains, which collect and store significant amounts of rainfall before being discharged into the main river, is called a Watershed Area (Daerah Aliran Sungai or DAS). The river plays a crucial role in holding the volume of rainwater to prevent it from seeping into the land or residential areas. However, there is a problem of sedimentation in the river, reducing its effectiveness in water retention. As stated by Maryanti et al. (2018), solid particles carried by river currents and deposited at the riverbed can cause the river to silt up. These particles may include debris, plants growing around the river, and soil particles due to excessive erosion. The consequence of river sedimentation is that the river becomes shallower and has a reduced capacity to store water due to sedimentation (Herman et al., 2023).

Therefore, it can be concluded that the geographical condition of Tunggul Irang Ilir Village, located in the Martapura River's environmental area, which serves as the catchment area, makes the area prone to flooding. This is due to the Martapura River's siltation, causing it to be unable to handle the rainwater discharged into it, leading to runoff from the rainwater flooding residential areas.

4. CONCLUSION

From the various research findings presented, it can be concluded that the floods in Tunggul Irang Ilir Village are largely caused by natural factors, particularly geographical factors including climate (rainfall), topography, and the natural landscape (proximity to the river basin). The flooding issue in Tunggul Irang Ilir Village is exacerbated by the high annual rainfall intensity during the rainy season. This is further compounded by the natural conditions in the area, characterized by lower topography compared to the surrounding regions, causing the village to receive water runoff from upstream or higher areas. Additionally, the proximity of the village's settlements to the Martapura River also contributes to the annual flooding in the area due to the river's sedimentation, preventing it from efficiently retaining water. As a result, flooding consistently occurs in this village every year (Apriani et al., 2023).

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