

Vulnerability and Social Resilience of Communities to Floods in Aceh

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Abstract.

This study aims to determine the vulnerability and social resilience of the Krueng Geukueh Village community, Dewantara District, North Aceh Regency, in facing flood disasters. The study used a descriptive qualitative approach with data collection techniques such as in-depth interviews, participatory observation, and document study. The results showed that the community faced high social vulnerability due to the location of houses in lowlands near rivers, the income of residents who are mostly traders with limited incomes, and limited access to information related to flood warnings. The severity of the flood in November 2025 was exacerbated by river overflows from Sawang District, which submerged residents' homes and public facilities such as PIM Hospital up to the roof. Nevertheless, the community demonstrated strong social resilience through mutual cooperation, social networks, adaptation strategies such as small boats and river monitoring, and coordination with village officials. Solidarity and cooperation among residents helped mitigate the impact of flooding, protect residents, and accelerate recovery. This study confirms that social vulnerability and social resilience are interconnected, where resilience emerges as a community response to the flood risks they face. These findings can serve as a reference for village governments and related parties to improve early warning systems, emergency response training, infrastructure improvements, and economic support for residents to strengthen community resilience to flooding.

Keywords: Social vulnerability, social resilience and Aceh floods.

I. INTRODUCTION

Flooding is one of the most frequent natural disasters in Indonesia, including in Aceh Province. Almost every year, several areas in Aceh experience flooding of varying severity. This condition is inseparable from natural factors such as high rainfall, the presence of large rivers, and low-lying areas. However, flooding is also closely related to social factors, such as changes in land use, increased settlements in flood-prone areas, and limited environmental and infrastructure management. Therefore, flooding not only causes physical losses but also has a direct impact on the social life of the community.[1].

In the study of disaster sociology, disasters are understood as events that do not stand alone, but are related to the social conditions of society.[2]One of these is social vulnerability, which refers to conditions where individuals or community groups have limitations in facing, responding to, and recovering from the impacts of disasters. Several contributing factors, including poverty, education level, type of employment, age, and access to information and public services, significantly influence a community's level of vulnerability to flooding. Social vulnerability means that the impacts of flooding are not felt equally by all communities. Communities with weak socioeconomic conditions tend to experience more severe impacts than others. The poor, the elderly, women, and children are often the most vulnerable groups when floods occur, both in terms of health, economics, and the sustainability of their social lives.[3].

However, communities also have the ability to survive and recover from disasters, known as social resilience. Social resilience describes a community's ability to support each other, adapt, and restore living conditions after a disaster. This resilience depends not only on external assistance but also on the community's internal strengths, such as solidarity, mutual cooperation, and social networks built through daily life.[4].

Acehnese society is known for its strong social bonds and shared values, particularly those based on tradition and religion. These values serve as crucial social capital in facing disasters. Previous research has shown that social capital, such as trust among residents, the role of community leaders, and family and religious networks, plays a significant role in strengthening community resilience after a disaster. In flood situations, this form of social resilience is evident in practices of mutual aid, resource sharing, and cooperation in evacuation and recovery processes. However, community social resilience does not always

align with their level of vulnerability. In some situations, existing resilience is temporary and unable to fully reduce vulnerability. Social inequality, limited access to resources, and a lack of community involvement in disaster management planning can weaken social resilience in the long term.

Based on these conditions, a study of the vulnerability and social resilience of communities to flooding in Aceh is crucial. A sociological approach is needed to understand how social structures, relationships between residents, and socioeconomic conditions influence a community's ability to cope with flooding. By understanding these two aspects, it is hoped that a clearer picture of the social conditions of Acehnese communities in facing flood risks and future efforts to strengthen social resilience will be obtained. Based on this background, the research questions in this article are as follows:

1. What is the condition of social vulnerability of the community to flood disasters in Aceh?
2. What forms of social resilience do Acehnese people take in facing and responding to flood disasters?
3. What is the relationship between social vulnerability and social resilience of communities in flood conditions in Aceh?

II. Literature Review

2.1 Social Vulnerability

Social vulnerability is a concept often used in sociological disaster studies to explain the conditions of communities that are easily affected when a disaster occurs. Social vulnerability relates to the social, economic, and political conditions that influence an individual's or group's ability to cope with a disaster, from the preparedness stage, during the disaster, to the recovery process. This means that the magnitude of a disaster's impact is determined not only by its magnitude but also by the social conditions of the community before the disaster occurs.[5].

Malthuf explained that social vulnerability often arises from inequalities in social structures. Groups with limited resources, such as low-income communities, the elderly, women, and children, tend to be more vulnerable when disasters strike. These limitations make it difficult for them to access information, health services, adequate housing, and secure livelihoods. This condition often causes these groups to feel the impact of disasters more severely and require longer to recover.[6].

Social vulnerability is also influenced by various other factors. Economic factors, such as income level and type of employment, significantly determine a community's ability to anticipate and respond to disasters. Furthermore, education level plays a role in shaping the community's understanding of disaster risks and risk reduction measures. Demographic factors, such as age and health conditions, also increase vulnerability, especially for the elderly and people with disabilities.[7].

2.2 Social Resilience

Social resilience is a community's ability to survive, adapt, and recover after experiencing a disaster. Social resilience is the strength or ability of a social group to face pressure and change without losing its primary social function. Social resilience relates not only to economic or physical strength, but also to the community's ability to work together and support one another.[4].

One of the key elements of social resilience is social capital. Social capital encompasses trust, norms, and social networks that enable communities to act collectively. In disaster situations, social capital becomes a key force because it fosters solidarity, mutual cooperation, and caring among residents. Communities with strong social ties typically respond more quickly to disasters and are better able to restore their social life after the disaster has passed.[8].

Social resilience is also influenced by several factors, including the strength of social networks, the role of community leaders, cultural values, and community experience in dealing with previous disasters. Strong social networks facilitate the exchange of information, assistance, and support among residents when a disaster occurs. Community leaders play a crucial role in coordinating collective action, building trust, and bridging relationships between communities and the government or aid agencies.[9]. Furthermore, cultural values emphasizing togetherness and mutual cooperation contribute to strengthening social solidarity in emergency situations. Repeated disaster experiences also shape knowledge and skills for adapting to disaster conditions, helping communities become more prepared and resilient in the face of future disasters.[3].

III. METHOD

This research uses a descriptive qualitative approach. Descriptive qualitative research is research that systematically describes a phenomenon based on qualitative data.[10] This approach was chosen because it can help researchers to deeply understand the social conditions of the community, their experiences during disasters, as well as the adaptation strategies and social interactions that occur in the field.

The location of this research is in Gampong Krueng Geukueh, Dewantara District, North Aceh Regency, as one of the locations affected by flooding in November 2025. The research subjects or informants include flood-affected communities, community leaders, village officials, and related parties involved in disaster management. Informants were selected using purposive sampling to obtain informants who have direct experience and knowledge related to vulnerability and social resilience in flood conditions.

Data were collected through three main techniques: in-depth interviews, participant observation, and document study. The in-depth interviews aimed to determine the community's social vulnerability (e.g., economic factors, education, and access to information), forms of social resilience (such as social networks, mutual cooperation, and adaptation strategies), and community perceptions of the relationship between vulnerability and social resilience. Participatory observation was conducted to directly observe social interactions, solidarity practices, and community responses during disasters. Document study included disaster reports, village records, and local policy documents related to flood risk mitigation.

The data was analyzed using thematic analysis, which allowed researchers to identify key themes according to the research focus: conditions of social vulnerability, forms of social resilience, and the relationship between the two. The analysis phase included data reduction, data presentation, and conclusion drawing. To enhance validity, this study utilized triangulation of sources and techniques, comparing information from various participants, observation results, and supporting documents.

IV. RESULTS AND DISCUSSION

The research results show that the residents of Gampong Krueng Geukueh face various forms of social vulnerability during flooding. Geographical factors are the primary cause; most residents' homes are located in low-lying areas near the Krueng Geukueh River, making them susceptible to flooding during heavy rains or overflowing rivers. Furthermore, the residents' economic conditions are also a significant factor. The majority of residents work as traders with limited incomes. This limits their ability to repair damaged homes or stock up on emergency supplies.

Access to information is also a factor in vulnerability. Not all residents have the means to obtain early information regarding flood warnings. Some residents only become aware of the flooding when water has already entered their homes, delaying evacuation responses.

The flooding that occurred in November 2025 worsened as the river from Sawang District overflowed, inundating not only residents' homes but also public facilities. One of the most striking examples was PIM Hospital, which was flooded up to its roof. This demonstrates that community vulnerability is also exacerbated by external factors, such as river overflows from upstream areas, which have widespread impacts and threaten vital facilities.

Mr. Ali (45 years old), as one of the residents affected by the flood, explained:

"When it rains heavily, our homes are always flooded. Many residents can't store food or clean water because their incomes are limited. Sometimes flooding information comes too late. Hospitals are even flooded up to their roofs, causing panic among residents."

This statement demonstrates that social vulnerability is not solely individual or local, but is also influenced by surrounding regional conditions, including river overflows from other areas. The extent of the flooding, which has submerged hospitals, represents a very high risk to the community, including access to healthcare and safety.

Mrs. Siti (38 years old) also stated that:

"Not everyone understands flood warnings. We only hear from neighbors or social media, but sometimes it's too late. The waters rise before we're ready."

Ms. Siti's statement emphasized that delays in information exacerbate the impact of flooding. The combination of physical factors (river overflows), economic factors, and communication factors make residents more vulnerable to loss, home damage, and potential health risks.

Forms of Social Resilience of Acehese Communities in Facing Floods

Despite facing high social vulnerability, the community of Gampong Krueng Geukueh demonstrated strong social resilience. This resilience was evident in mutual cooperation (gotong royong), social networks, and adaptation strategies. Mutual cooperation was the primary mechanism. Residents helped each other evacuate belongings, children, and livestock. They also independently established emergency posts to provide food, clean water, and emergency supplies.

Mr. Rahman (50 years old), as the village head or Geuchik Gampong said:

"We always remind residents to help each other. During floods, we work together to save belongings and bring children to safety. Without cooperation, the impact of flooding will be much greater."

This statement demonstrates that social resilience emerges from solidarity and cooperation among citizens. This cooperation not only reduces the risk of material loss but also strengthens residents' sense of security and confidence in facing disasters. This demonstrates that social resilience is the result of active and sustained social interaction.

Mrs. Fitri (30 years old), a local volunteer, added:

"In addition to mutual cooperation, we also prepared small boats and food supplies. We knew when the river would start to overflow, so we could quickly evacuate the most affected residents."

This statement demonstrates that community social resilience extends beyond physical assistance to well-planned adaptation strategies. The readiness of boats, food supplies, and river monitoring demonstrate the community's ability to predict risks and act quickly, thus mitigating the impact of flooding.

Based on researchers' observations during the floods, informal coordination between residents and village officials was evident. Village officials provided early warnings, while residents formed local emergency response groups. This interaction strengthened social resilience by fostering solidarity, communication, and shared responsibility.

The Relationship between Social Vulnerability and Social Resilience of Communities in Flood Conditions

Thematic analysis shows that social vulnerability and social resilience are interrelated. High social vulnerability encourages communities to develop stronger social resilience as an adaptive mechanism. The higher the risk faced, the more visible the role of mutual cooperation, social networks, and adaptation strategies.

Mr. Ali said:

"Even though our house is often flooded, we can minimize the damage because we help each other. Without mutual cooperation, it would have been much worse. This shows that if we are weak on our own, the impact of flooding is enormous."

This statement emphasizes that social resilience serves as a buffer against vulnerability. Even when residents are at high risk due to housing or economic circumstances, solidarity and cooperation enable them to mitigate the negative impacts of flooding.

Mr. Rahman added:

"Vulnerability is real, but communities can survive because of solidarity. Even those whose homes are far from the river help their neighbors. Social connections make us better prepared for disasters."

This demonstrates that social resilience is not merely an individual capability, but a collective one. Strong social interactions, community support, and coordination with village officials enable communities to more effectively face high risks. Thus, this study confirms that social resilience emerges as a response to social vulnerability, particularly when individuals face disasters.

V. DISCUSSION

The research results show that the residents of Gampong Krueng Geukueh face a high level of social vulnerability to flooding. The main factors of this vulnerability are geography, economic conditions, and

access to information. Most residents' homes are located in low-lying areas near rivers, making them easily inundated during heavy rain or overflowing rivers. Furthermore, the majority of residents work as traders with limited incomes. This economic condition limits their ability to strengthen their homes or prepare emergency supplies, such as food and clean water. This situation was exacerbated when the November 2025 flood occurred due to the overflowing river from Sawang District, which not only submerged residents' homes but also public facilities, such as the PIM Hospital, which was flooded up to its roof. This incident demonstrates that the community's social vulnerability is influenced not only by internal village conditions but also by broader external factors, including the upstream areas. This finding aligns with research by Lesmana and Larasati in Kalianyar Village, Pasuruan Regency, which found that communities living in flood-prone areas have varying levels of vulnerability, but remain high, particularly from an economic and social perspective due to limited capabilities and access to resources. Consequently, adaptation efforts have not been fully effective in reducing the risk of flood losses. In this case, the community made various adaptation efforts such as raising houses and building flood barriers, but overall the adaptation was deemed inadequate. [11].

Social vulnerability is also evident in limited access to information. Some residents only learn about the flooding when water begins to enter their homes, delaying evacuation. Flood warnings often arrive late, via social media or from neighbors. This delay in information increases the risk of losses, both material and non-material, such as life and health risks. Thus, the social vulnerability of the community here is multidimensional, encompassing physical, economic, and social aspects. [12].

Despite facing high vulnerability, the community demonstrated strong social resilience. This resilience was evident through mutual cooperation, social networks, and adaptation strategies. Residents helped each other evacuate belongings, children, and livestock. They also independently established emergency posts to provide food, clean water, and other necessities during the floods. A sense of solidarity and cooperation among residents was key to mitigating the negative impacts of the floods. Furthermore, Ms. Fitri added that residents also prepared adaptation strategies, such as small boats and river monitoring, to enable more rapid evacuation of affected residents. This demonstrates that social resilience encompasses more than just physical action, but also planning and preparedness.

Observations also revealed informal coordination between residents and village officials. Village officials provided early warnings, while residents formed local emergency response groups. This interaction strengthened social resilience by involving solidarity, communication, and shared responsibilities. In other words, social resilience emerged not just from individuals, but from the collective ability of communities to work together, support each other, and develop disaster adaptation strategies.

The relationship between social vulnerability and resilience is clearly evident in flooding. Residents whose homes are frequently flooded or whose economic resources are limited are still able to mitigate losses through solidarity and cooperation. Despite the high risk, mutual cooperation helps communities mitigate the impact of flooding. Thus, it can be said that social resilience is a collective capability, not just an individual one. People whose homes are far from rivers still help their neighbors, so that the entire community is better prepared for disasters. Social resilience also serves as a buffer against social vulnerability, reducing risk and accelerating post-flood recovery.[13].

Overall, this study confirms that the Acehnese community faces high social vulnerability due to geographic conditions, limited economic resources, and limited access to information. However, the community also possesses strong social resilience capacities through mutual cooperation, social networks, adaptation strategies, and coordination with village officials. This social resilience is a direct response to the social vulnerability they experience, enabling the community to survive and minimize losses from the floods despite the high risk.

VI. CLOSING

This study shows that the Krueng Geukueh Village community is highly vulnerable to flooding due to several factors, including the location of houses near rivers in low-lying areas, the income of residents, most of whom are traders with limited incomes, and limited access to information about flood warnings. This

vulnerability was exacerbated when the river from Sawang District overflowed, submerging residents' homes and public facilities, including the PIM Hospital. Despite facing high risks, the community remained resilient due to its strong social resilience. Social resilience is evident in mutual cooperation (gotong royong), social networks, adaptation strategies such as small boats and river monitoring, and coordination with village officials. Community solidarity and cooperation helped mitigate the impact of flooding, protect residents, and accelerate recovery. The results of this study indicate that social vulnerability and social resilience are interconnected, with community resilience emerging in response to the risks faced.

Based on the results of this study, it is recommended that village governments and relevant authorities improve flood early warning systems so that all residents can quickly receive information. Communities also need to be continuously trained in emergency response, such as forming emergency response groups, setting up emergency posts, and implementing simple but effective adaptation strategies. Improving infrastructure, such as river embankments and drainage, is also crucial for reducing flood risk. Furthermore, economic support for residents, such as through capital assistance or business training, will help them be better prepared for disasters. By combining physical, social, and economic efforts, community resilience to flooding can be strengthened and the impact of disasters can be minimized.

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