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SAVE THE COMMUNITY FROM THE FLOOD HAZARD: THE PERSPECTIVE OF COMMUNITIES SURROUNDING THE LAKE

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Abstract: *The community has a strategy facing floods. This research aims to analyze (1) the community's mitigation, (2) the community's action during the flood, (3) the community's post-flood action, (4) the community's effort to avoid flood's effect. This research's approach is explanatory-sequential design. Data collection used questionnaires, in-depth interviews, observations, literature studies. Quantitative data analysis used descriptive statistics and qualitative data analysis used a 3-step technique. The results are (1) community mitigation: cleaning the lake and the river from waste, preparing the boat, preparing the empty land for the animal, and making higher the house. (2) community actions during flooding: picking up things to the place under the roof, building the higher place into the home, building the bamboo bridge, saving the vehicle in other families, saving the animal in the safety place (3) actions after flooding: cleaning mud post-flood, improving the broken part of the home, putting back things post-flood, broken the bamboo bridge. (4) efforts to avoid impact of flooding, having housing provided by the government and utilizing bridges. The conclusion that all community actions to deal with floods are collectivity for the community.*

Keywords: *mitigation, flood disaster, preparedness, social action*

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1. Introduction

Sociologically saving the community from the threat of flooding can be understood as a social action of the community facing a flood disaster (Daddoust et al., 2018). These social actions include disaster management steps including the mitigation stage, the preparedness stage, and the post disaster recovery stage (Karana & Supriharjo, 2013; Robbani et al., 2020). The countermeasures stage in this context is called non-structural countermeasures. Mitigation is structural if it involves the government as the person in charge of the policies in it (Taryana et al., 2022).

Disaster management measures around the world are uniform in stages (mitigation stage, preparedness stage, and post disaster recovery stage) which are inferred from years of experience in disaster management programs including local knowledge around the world (Desportes et al., 2016). The stages of countermeasures can be applied to all types of disasters that have ever existed, such as hydro-meteorological disasters, natural disasters, and so on. Mitigation of flood disasters, for example, in Europe, America, Asia, with the characteristics of each flood complements the experience of coping with the community along the Brahmaputra river adapting to floods, flash floods and other disasters. Communities along the Brahmaputra river have gone through various types of disasters and they have experience surviving these disasters (Das et al., 2009).

Flood management in Indonesia, both structural and non-structural, has been extensively researched and documented. Non-structural countermeasures such as the local wisdom of the Bringin drainage sub-system community in dealing with flooding (Waskitaningsih, 2012), Local wisdom about disaster mitigation in the Baduy community (Permana et al., 2011). Structural countermeasures such as the concept of handling flood disasters at Housing Manggala Makassar City (Arifin et al., 2021), study of the implementation of flood control strategies in the Jeneberang Hilir sub-watershed (Case Study of Flood Control in Makassar City) (Nandini, 2010), etc. Thus, the flood disaster mitigation policy is reviewed from 3 aspects, namely (1) land characteristics, (2) flash flood hazard level, and (3) social vulnerability (Putri, 2018; Rachmat & Pamungkas, 2014). Areas with such conditions require both structural and non-structural mitigation (Dinia Putri & Syafei, 2022). However, research on flood disaster management in communities around the lake has not been widely carried out, especially in Indonesia.

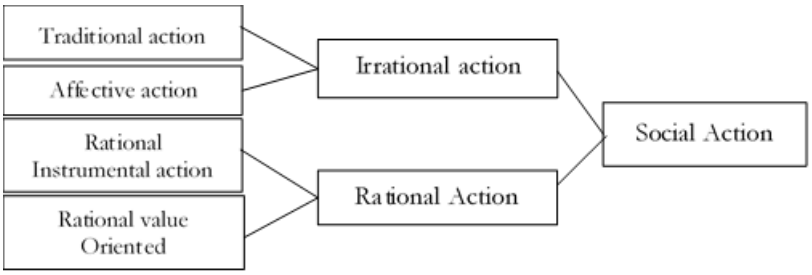
The urgency of this research is (i) the community in the lakeside area needs to improve their quality of life so that they need to solve the problem of flooding, (ii) regional development can be resolved if the community contributes to flood control, (iii) Tempe Lake is a tourist destination so that it requires the involvement of the local community to maintain and protect it. Thus this research will answer the following research questions: (1) to analyze the mitigation strategy of the community before the flood, (2) to analyze the social action of the community during the flood, (3) to analyze the social action of the community after the flood, (4) to analyze the efforts made by the community to avoid the effects of flood.

2. Conceptual Framework

Social Action

According to Max Weber, social action is an action that is clearly directed at other people, it can also be an action that is inner or subjective in nature that may occur due to the positive influence of a particular situation or is a deliberate repetitive action as a result of the influence of a similar situation, or in the form of an agreement. positively in certain situations (Ritzer & Stepnisky, 2021). Furthermore, Weber's social actions are classified as follows: traditional actions and affective actions are a form of irrational action in humans, while value-oriented rational actions and instrumental rational actions are manifestations of rational action in humans (Nutani, 2016; Setiadi & Kolip, 2011; Soekanto, 2019). Each type of rational action is in the following figure.

Figure 1: Weber's Social Action



Source: Kamanto, 2004

Mitigation

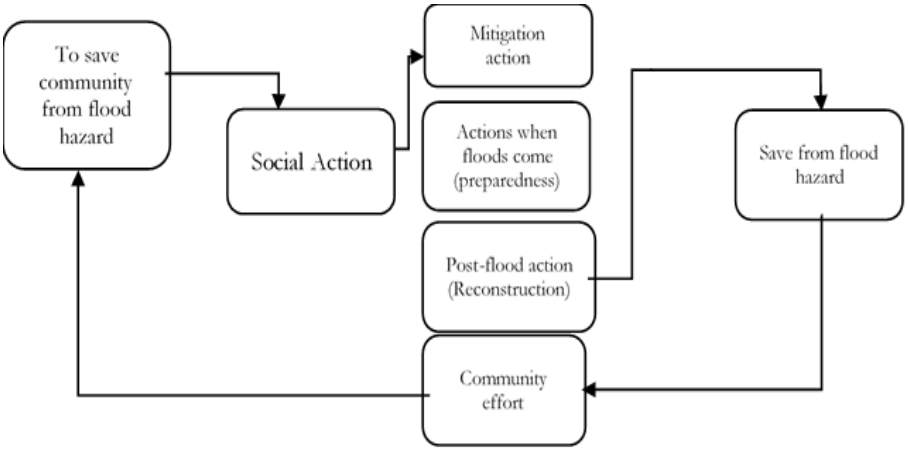
Mitigation is understood as the series of efforts to reduce disaster risk, both through physical development and awareness and capacity building in dealing with disasters (Halim & Zainuddin, 2017). to reduce losses caused by disasters, it is necessary to create disaster mitigation plans, plan evacuation routes, and increase capacity in emergency response management and guide the community in steps to reduce losses due to disasters. In disaster mitigation there are four important things, namely: (1) Availability of information and maps of disaster-prone areas for each type of disaster (2) Existence of outreach to increase public understanding and awareness in dealing with a disaster (3) Knowing how to save oneself, what needs to be done carried out and avoided during a disaster (4) There are arrangements and arrangements for disaster-prone areas to reduce threats (McEntire, 2011).

Preparedness

Preparedness is thus defined as actions taken in advance of a flood disaster to ensure adequate response to its impacts and relief and recovery from its consequences (Paton, 2003). This preparedness is closely related to community resilience which means the

capacity of the community and its members to recover from the effects of hazard exposure to disasters (Klein et al., 2003). Yield losses and risk losses are 2 things that can be reduced with resilience (Chan & Liao, 2022). These two things are also a disaster risk reduction strategy including the environment (Alexander, 2013; Weichselgartner & Obersteiner, 2002).

Figure 2: Conceptual framework



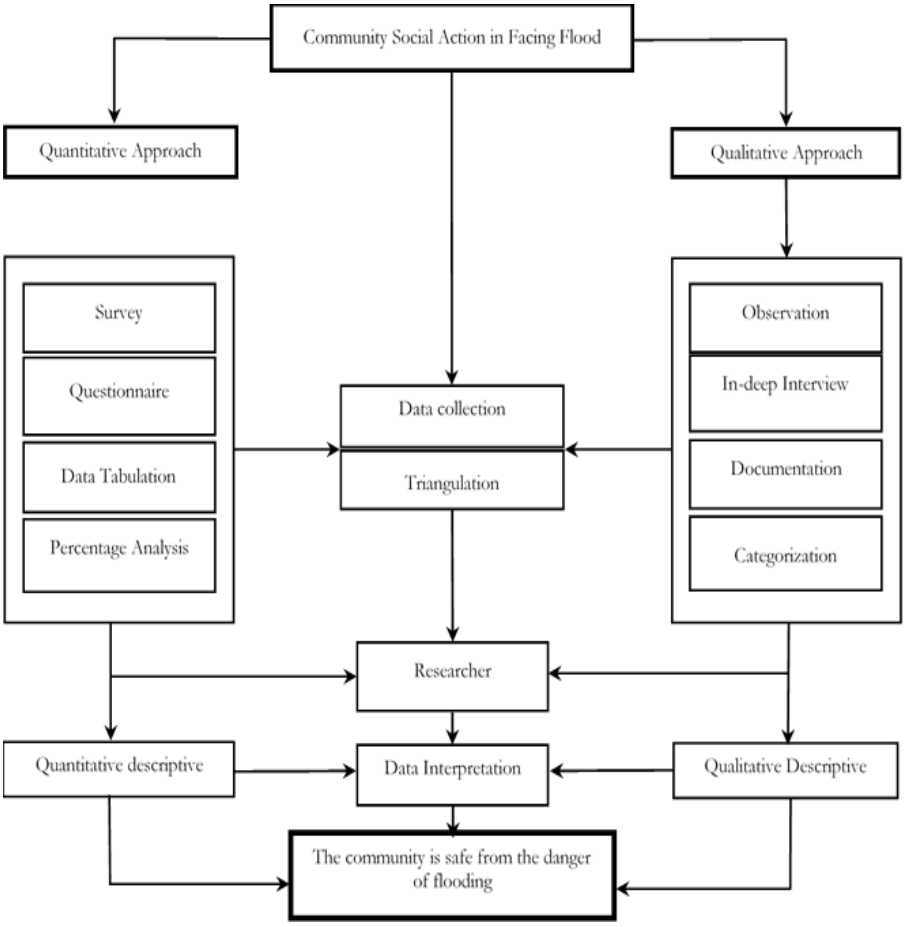
Source: author's elaboration, 2023

3. Method

Research Design

This study uses a mixed method approach, namely quantitative-qualitative with an explanatory-consequential design (Creswell, 2013). Data were obtained through observation, in-depth interviews, surveys, and documentation (Bungin, 2015; Emzir, 2010; Oetomo, 2015). Quantitative data in this study is used to explain social action in mitigation, social action when flood coming, social action post flood while qualitative data is used to describe community effort to avoid the negative effect of flood. Triangulation in this study is used by researchers to check and validate data by combining the results of data acquisition through observation, in-depth interviews, and documentation. Furthermore, the case study was chosen with consideration: (1) case characteristics are complex in the sense that data examination is carried out in depth, detail, and detail; (2) case studies are used to explain developing situations based on facts found in the field; and (3) case studies are used to explore in-depth information related to the phenomenon of community social action in facing flood. The quantitative-qualitative approach in this study is presented in Figure 3 below.

Figure 3: Combined sequential quantitative-qualitative approach

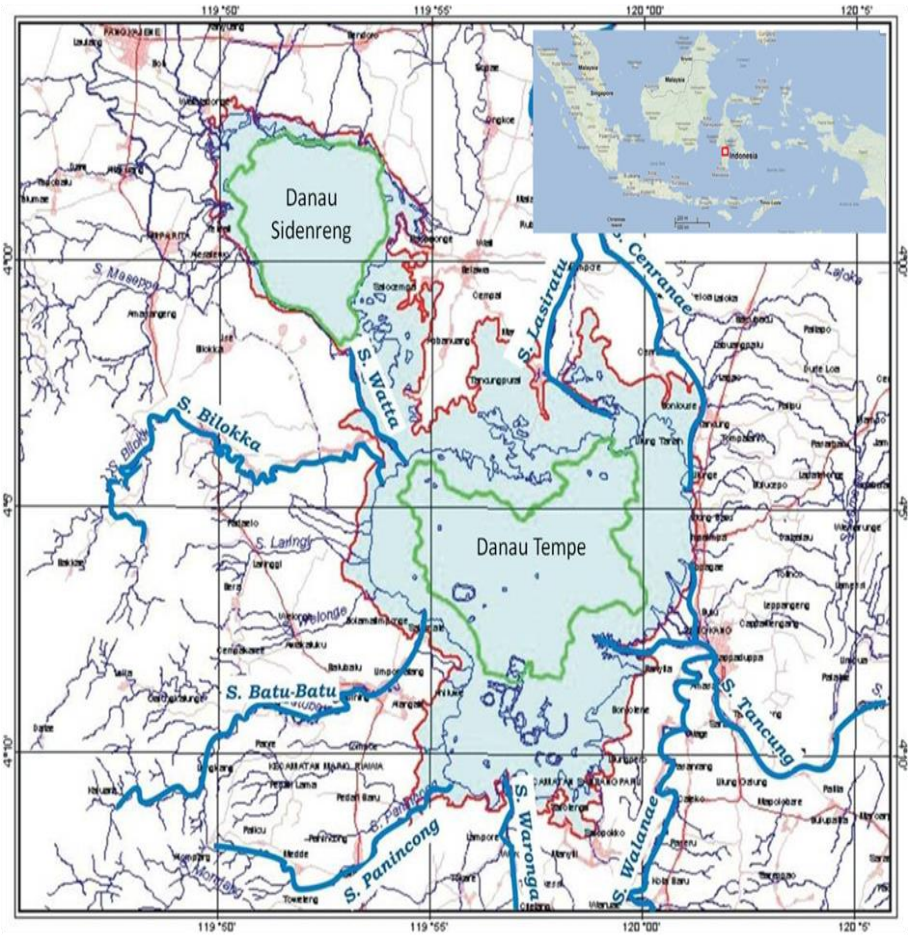


Source: author's elaboration

Study Area

This research was conducted in the area around Tempe Lake from July 2021 to December 2021 in Wajo District, South Sulawesi province. The research area around the lake namely (i) Bakke Orai hamlet, (ii) Baru Orai hamlet, (iii) Baru Alau hamlet, (iv) Bakke Alau hamlet, and (v) Padduppa hamlet. The research location is presented in Figure 3 below.

Figure 4: Map of Tempe lake and Province of South Sulawesi, Indonesia, 2023



Source: Mansor and Onrizal, 2013

Data Collection Method

Observation

Observation in this study was used in data collection, namely: community social action in mitigation, when flood coming, and social action post flood. The instruments used in collecting data through observation are (i) field notes, (ii) periodic notes, and (iii) checklists. Furthermore, the results of observations obtained by researchers are used to describe the situation or events that are taking place in relation to research variables such

as mitigation, social action when flood coming, and social action post flood, (ii) community efforts to avoid the effects of flooding.

In-depth Interview

In-depth interviews were used to collect data on (i) social action in mitigation, social action when flood coming, and social action post flood, (ii) community efforts to avoid the effects of flooding. Furthermore, the tools used in the in-depth interviews were tape recorders, pictures, and interview guidelines with loose notes, checklists, and rating scales. Thus, the functions of in-depth interviews in this study are (i) description, in this case to describe the situation and conditions of the community, (ii) exploration, in this case exploring the field for the purpose of obtaining information related to community social action in mitigation, social action when flood coming, and social action post flood, and solution for the community. Both of these are used by researchers to emphasize the situation and conditions of the field based on the results of the observations that have been carried out.

Documentation

This study used several documents, including: (i) Bakke Orai hamlet, (ii) Baru Orai hamlet, (iii) Baru Alau hamlet, (iv) Bakke Alau hamlet, (v) Padduppa hamlet, (vi) Tempe lake picture and (vii) community activity when flood coming.

Questionnaire

A questionnaire instrument was used for data collection, including: (1) community social action in mitigation; (2) community social action when flood coming or preparedness; (3) community social action post flood, (4) community efforts to avoid the effects of flooding. Furthermore, the questionnaire in this study is used for two purposes, namely (i) descriptive, in this case describing the situation and condition of the object of research based on the facts found in the field, and (ii) ordinal scale is used in measurement based on the grouping of data obtained in the field. The value scale set is distinguished by five categories, namely (i) value 5 for the category strongly agree, (ii) value 4 for the category agree, (iii) value 3 for the ordinary category, (iv) value 2 for the category disagree, (v) value 1 for the category strongly disagree.

Questionnaires were distributed to the community around the Tempe lake. The completion of the questionnaire was guided by the researcher and the enumerator. Enumerators were selected with the following considerations: (1) Having the ability to collect data; and (2) Understanding the characteristics, social reality, and behavior of the community. Furthermore, the research sample was determined using the stratified sampling technique (Sugiyono, 2010; Suyanto, 2015) as follows.

Table 1: Population and research sample

No.	Name of hamlet	Population	Sample
1.	*Bakke Orai* hamlet	240	72
2.	*Baru Orai* hamlet	200	60
3.	*Baru Alau* hamlet	190	57
4.	*Bakke Alau* hamlet	170	51
5.	*Padduppa* hamlet	200	60
	Total	1000	300

Source: Tempe village community documentation, 2023

Table 1 shows that there are 5 hamlets included around the Tempe lake which always gets flooded in Wajo District area. The total population of 5 hamlets are 1000 people. There is 30% each of the population taken as a sample (Sugiyono, 2019), so the research respondents are 300 people.

Furthermore, the general characteristics of respondents based on age, number of family member, vehicle ownerships, boat ownership, and livestock ownership are presented to illustrate the circumstances that contribute to their social action in facing flood. These are presented as follows.

Table 2: Characteristics of research respondents

No.	Demography	f	%
1.	Age		
	a) 41-45 years		
	b) 46-50 years		
	c) 51-55 years		
	d) 56-60 years		
	e) 61> years		
	Number of family members		
	a) 1-2 person		
	b) 3-4 person		
	c) 5-6 person		
	d) 7-8 person		
	e) 8> person		
	Vehicle ownership		
	a) Motorcycle		
	b) Car		
	Boat ownership		
	a) Nothing		
	b) 1 boat		
	c) 1> boat		
	Livestock ownership		
	a) Chicken, duck, duck, goose		
	b) Cattle, horse, goat		

Source: Results of questionnaire processing, 2023

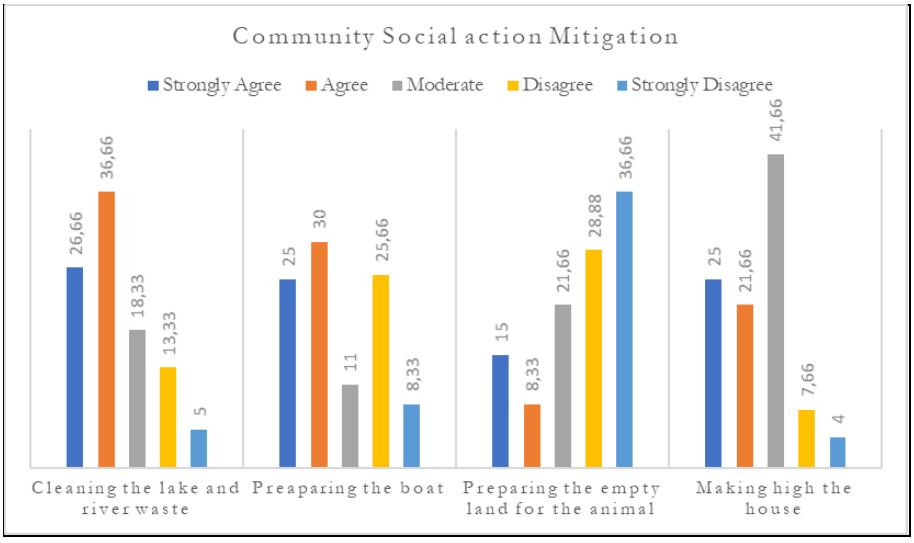
Data Analysis Method

Quantitative analysis in this study uses the descriptive Statistics analysis method. Descriptive statistical analysis is used to describe the indicators of each variable used. Qualitative analysis in this study refers to the results of data obtained through observation, in-depth interviews, and documentation. Data analysis was conducted through three categories, namely data reduction, data display, and conclusion. The three processes were carried out by separating information into categories based on informants' views and facts found in the field. Furthermore, the stages of qualitative analysis include: (i) domain analysis, in this case based on the social situation that takes place including place, actor, and activity, (ii) taxonomy analysis, in this case the domain that is determined is then described in detail. This means that mitigation before flood coming) variables, preparedness (when flood coming) variables, post flood variables, involvement in government program variable are described in detail, (iii) componential analysis is carried out by contrasting situations and field conditions that show differences in conditions between lakeside community characteristics and other community characteristics that are often exposed to flooding, and (iv) cultural theme analysis is carried out by integrating across domains found in the field. The aim is to explain the variables in this study in relation to other variables.

4. Findings

Community social action in mitigation

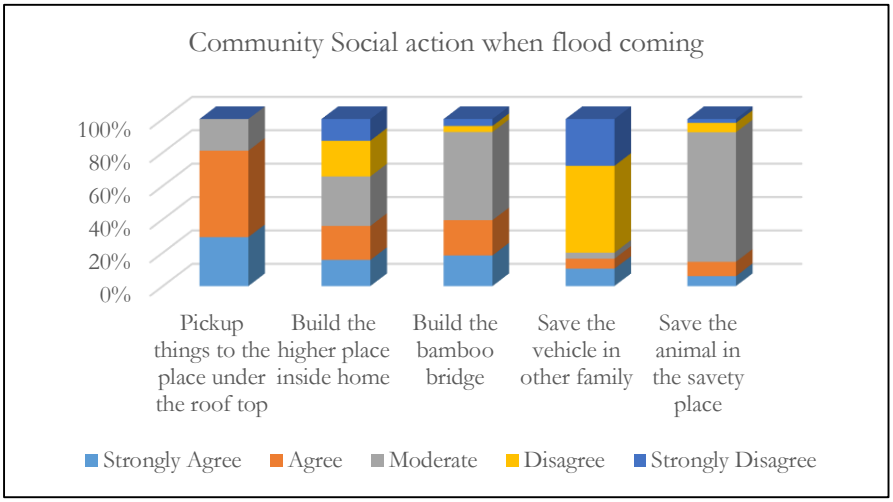
Figure 5: Community social action in mitigation



This strategy is carried out before a flood occurs in preparation for reducing the risks it poses. These actions include (1) Cleaning up lake and river rubbish is the main cause of flooding in addition to the silting up of lakes and rivers. However, it is not the community's authority to dredge lakes and rivers but the authority of the government and the private sector. The community can participate in alleviating flooding by cleaning up the large amount of rubbish in the lake in the form of logs, grass and weeds, household waste, and so on carried by the flow of water from outside the lake. People who actively do this activity (63.32% strongly agree and agree) outnumber those who moderate and do not (18.33%). (2) In addition to cleaning up lake and river rubbish, a common thing that people do is to raise the pillars of their houses and all residents have houses on stilts. This activity is mostly done by 46.66% of residents, 41.66% of moderate residents and 11.66% who do not do it at all. This type of house is suitable for lakeside conditions that are often flooded. Even though people can raise their houses by about 1 metre, they are still likely to be flooded in the event of lake overflow. (3) Preparing a boat is the most likely action for boat owners because not all people own a boat. Residents who own boats use them for river transport and some keep them in reserve in case of flooding, which they can use and lend out. In this regard, 55% of residents prepare boats, 33.99% do not prepare at all and 11% are moderate. (4) For people with pets, they will look for and clear vacant land to prepare a place to save their pets. Most of them utilize vacant land around the lake and are free from flooding. They will bring their pets such as cows, goats, chickens, ducks or horses, etc. to the land. There are 65.54% of residents who do not have livestock or pets so they do not need to prepare vacant land, 21.66% who are moderate, and only 23.33% who are quite dependent on their pets and prepare land.

Community social action when a flood occurs (Preparedness)

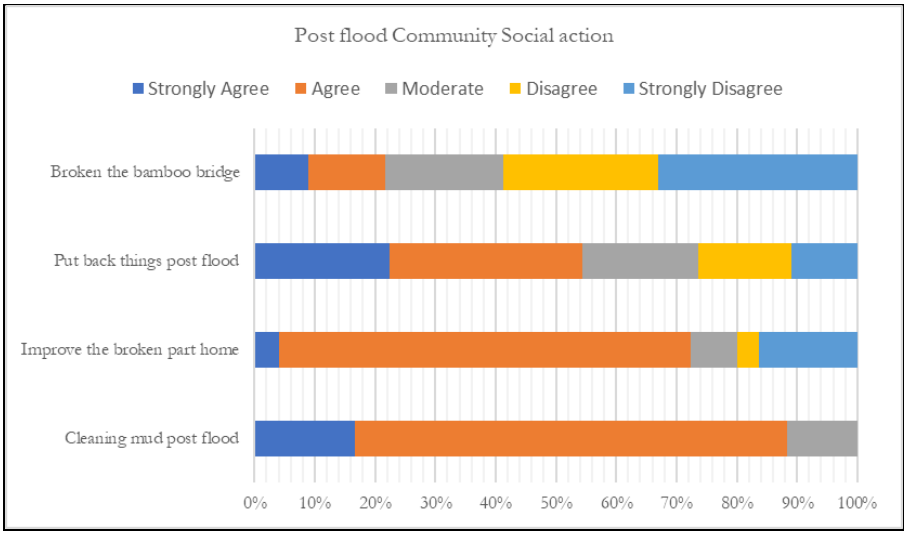
Figure 6: Community social action when a flood occurs



When the floods come, people no longer panic because they have prepared everything in anticipation of a greater impact. Social actions taken include (1) Moving goods to the attic. As many as 25.5% of respondents strongly agreed and 50% agreed, and 18.33 were moderate. (2) Creating a higher storage area in the house that is not reached by floods. In this regard, 15.66% strongly agreed, 20.22 agreed, 29.66% moderated, 21.33 disagreed, and 13% strongly disagreed. (3) Build bamboo walkways to walk above the water, 22% strongly agreed, 25.33% agreed, 63.33% moderated, 4.33% disagreed, and 5% strongly disagreed. This walkway connects houses within the village to the main road or a flood-free location. This bamboo walkway is made by men working together while women prepare food and drink. (4) Leaving vehicles with families whose houses or locations do not experience flooding. 8.66% strongly agree, 5% agree, 3% moderate, 43.33% disagree, and 23.33% strongly disagree. Those who agree and strongly agree to leave their vehicles are those whose houses are safe from flooding, while those who agree to leave them are those whose locations are not safe from flooding. (5) Saving livestock in a safe place. In relation to this, 6% strongly agree, 8.66% agree, 78% moderate, 51.51 disagree, and 2.33% strongly disagree. Those who strongly agree and agree are those whose livestock are in danger of being carried away while disagreeing means it is safe. A moderate answer means that livestock can be threatened with death or not depending on the size of the flood. If a large flood occurs, it means that livestock are threatened, if a small flood occurs, it means that it is safe.

Community social action during post flood

Figure 7: Post-flood community social action



The receding floods have left behind dirt, rubbish and mud. In view of these conditions, people still have to work hard, namely: (1) Cleaning up dirt, rubbish, and mud at home brought by the flood. 16.66% strongly agreed, 71.66% agreed, and 11.66% were moderate. This means that al houses are dirty because none of the residents disagree. (2) Returning items that had moved to their original places. There were 22.33 respondents strongly agreeing, 32% agreeing, 19.33% moderating, 15.33% disagreeing, and 11% strongly disagreeing, (3) Repairing parts of the house damaged by flooding such as the walls of rooms or walls of houses that leaked due to flooding. In this regard, 4% of respondents strongly agreed, 68.33% agreed, 7.66% were moderate, 3.66% disagreed, and 16.33% strongly disagreed. (4) Dismantling bamboo walkways connecting houses or roads and returning the bamboo and tools. There were 9% strongly agree, 12.66% agree, 19.66 moderate, 25.66% disagree, and 33% strongly disagree.

Community efforts to avoid the flood effect

Lake Tempe is the largest lake in South Sulawesi. In the past 2 decades this lake has experienced siltation and narrowing. The siltation was caused by the large amount of material that was carried into Lake Tempe by small rivers connected to the sea in the bay of Bone. The Wajo district government has been dredging rivers and lakes little by little but the results are not optimal Since 5 years ago. The dredging also stopped the program, the government diverted it to other programs such as the construction of residential areas.

Meanwhile the government is building public facilities. One of the facilities built is a bridge. This bridge serves to connect all research locations with roads. Previously, people had to cross by boat if they wanted to go to the main road or for community activities such as shopping, going to school and working. Therefore, the government built a connecting bridge between the highway and the area so that the mobility of the population is smooth.

As a result of the construction of the bridge, traffic in and out of the area became heavy with high frequency. Eventually, many people owned and built houses elsewhere that were safe from flooding. When the flood came, they evacuated to other houses. However, they stayed in the first house that was flooded because the land was fertile and used for farming. The location is also not far from the fishing location that is their livelihood.

5. Discussion

Community social action in mitigation

Mitigation is an action taken by the community before the flood occurs. Mitigation is intended as a precautionary measure or greater risk reduction in the event of a flood. Actions taken by the community at the research location such as raising the house (Halim & Zainuddin, 2017), or raise the pillars of the house (Halim, 2016) is the result of research that has the same characteristics, namely the banks of the river with the possibility of a

flood disaster. Mitigation is also always unique and different because of the different physical environment and even so, mitigation always aims to reduce the risk of more severe losses and harm people's lives.

At this mitigation stage, the role of the government and other institutions is very urgent. Their role is closely built through the strength of social capital, especially in empowering community resources aimed at handling floods (Bodin & Crona, 2008; Brown & Ashman, 1996).

Community social action when a flood occurs

Likewise, when a flood occurs, there are special actions that are more urgent and urgent to take, namely preparedness. This preparedness issue requires community knowledge specifically for disaster. The results of this study are in line with the results of other studies that the community needs knowledge related to something new to be said to be prepared (Mas'Ula et al., 2019). In addition to community preparedness, it is also necessary to have a certain level of government preparedness as the person in charge (Erlia et al., 2017; Rahma & Yulianti, 2020). In a society with an agrarian character, social capital is thick with togetherness, mutual cooperation and social solidarity. When the flood occurred, all the actions were sudden, in an atmosphere of urgency, wanting to save each other what they could.

Community social action during post-flood

Post-flood is the final phase of handling residual floods. There are various things that are caused during a flood and require serious attention and handling. The most common thing that happens is that floods bring silt into the house and it can settle on the floor of the house for days if it is not anticipated. In addition to mud, floods also bring garbage. Overcoming garbage and silt, women play a very important role in cleaning it up (Ha et al., 2022). Sometimes the local government, such as the village head, involves non-formal institutions (Dinh et al., 2021) such as volunteer groups for cleaning and handling all damage caused by floods such as damaged houses and so on.

Community effort from the effects of flooding

Population growth has consequences for area expansion and this requires new land to build housing (Haslinda B. Anriani et al., 2019). There are lots of housing built by the government to respond and this is a solution for people who are often affected by floods. There are several types of facilities provided for those affected by flooding to have a place to live in a residential area. Consideration of the ease of service is carried out by taking into account the socio-cultural conditions of the flood-affected community such as they are flood victims, their livelihoods are disrupted, their income is small and not fixed. The impact of such a policy is that many residents in flood locations have alternative housing or affordable housing so that they have alternative housing in the event of a flood.

6. Conclusion

Actions taken by the community to save the community from floods are collective actions carried out by all members of the community at the research location. These actions were carried out in mutual cooperation, full of togetherness, good cooperation and based on common interests, both affected by the flood and both safe from the flood.

These collective actions include pre-flood mitigation social actions, social actions when floods occur, and social actions during post-flood events. There is an acceleration of social action for the involvement of the government and private institutions to help ease the burden on society.

The efforts made by the community to reduce the impact of flooding on them are to find alternative places to live when a flood occurs. There is a lot of housing provided by the local government at affordable prices and other conveniences and the places around the lake are still inhabited when there is no flood so they can grow crops again.

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Declaration of conflicting interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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