

# ***Bonding Social Capital in Reducing the Risk of Flood Exposure of Lake Tempe in South Sulawesi***

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**Abstract**—Flood exposure becomes a routine flood disaster in the area around Lake Tempe, but people were able to survive and adapt to the annual flood disaster. This research was conducted to explore the social capital of the community in areas affected by the flood exposure of Lake Tempe so that it can be mapped so that flood management is more comprehensive and can be accepted by the community. In mapping the role of social capital owned by the community, researchers identified that bonding social capital is the main social capital owned by the community. The qualitative method with the operational component model is applied in this study. The results of the study found that bonding social capital has a role in reducing the risks of flood exposure of Lake Tempe. This can be seen from the seven indicators of bonding social capital inherent in the local community, namely: (1) culture, religion, habits and language; (2) livelihoods; (3) social facilities and public services; (4) social norms; (5) legal and customary rules; (6) settlements; (7) length of the stay. From this study it is concluded that the bonding of social capital of the community is from the adaptation of the community to face flood exposure faced every year. From this research it is recommended that stakeholders involved in handling flood exposure of Lake Tempe can maintain and develop the social capital bonding that is currently owned by the community.

**Keywords**—: *Social capital bonding; flood exposure; homogeneous characteristics*

## I. INTRODUCTION

### 1.1. Background

At the end of 2017 BNPB through the Head of Data and Information Center and Public Relations of the National Disaster Management Agency (BPBD) said that 95% of disasters in Indonesia were meteorological hydro disasters [1].

The trend of natural disasters in Indonesia in the last 10 years shows that it is dominated by floods and natural disasters. One of the areas in Indonesia that undergoes routine flood disasters every year is the flood that occurred in the area around Lake Tempe. This flood was called as a flood exposure of Lake Tempe.

Floodplain is a flat land area around a river or lake that is flooded by floods, this is because the capacity of the river or lake to accommodate the flow is exceeded which causes the

water to overflow. In the flood season, flood exposure can form larger lakes than usual. This happens because there is a union or connection of small lakes. Conversely, during dry or dry season, flood flow and exposure function to fill the flow of river water bodies [2]. Flood exposure in the area of Lake Tempe has the effect of uniting Lake Tempe, Lake Sidenreng and Lake Buaya into one lake.

Characteristics of Lake Tempe waters have large water fluctuations, reaching 5.6 meters [3]. The lake of flood exposure despite having large water level fluctuations, its depth is relatively shallow compared to other lake types [4]. Data released by Lake Tempe water level measurement station, the average height is of 2.1 meters. The most common High Intensity Water Surface occurs at an altitude of 2-2.5 meters. Lake Tempe has the high-water period starting in May to August and reaches its peak in June.

The case of flood exposure of Lake Tempe can be categorized as pure natural disaster/ natural disaster [5]. There is or no human activity around it, flood will still occur. The people who live in this area have understood this condition, so that the culture of the community has adapted to the nature of the existing nature.

The purpose of this study is to explore the social capital owned by the community and its contribution to the resilience of communities affected by the flood exposure of the Tempe lake. Bonding social capital, has a significant contribution in shaping community resilience in the flood prevention of flood exposure of Lake Tempe.

Lake Tempe is located in three districts in South Sulawesi, namely in Wajo district (2/3 of the area of Lake Tempe) and the rest are in the Sidenreng Rappang (Sidrap) and Soppeng districts. This study focused on areas where administratively all of the land area was affected by flooding due to exposure to the Tempe lake overflow, namely Laelo and Salomenraleng villages in Tempe District, Wajo District.



**Picture 1**  
*Map of Lake Tempe – South Sulawesi*  
Source : Googlemap 2018

## 1.2. The Theoretical Framework

### 1.2.1 Concepts, Types and Functions of Social Capital

Social capital is the mechanism and relationship among trust, norms, and networks in social settings in a certain area [6]. These values are useful in the case of disaster-prone areas. Social capital is a strong capital that is owned by the community to adapt so that it creates community resilience in the face of disasters. Social capital can also be understood as the ability of the community to work together to achieve common goals in the community and organization [7].

There are three types of social capital, namely: (1) social capital bonding; (2) bridging social capital; (3) linking social capital. Bonding social capital can be seen from cultural values, perceptions, traditions or habits. Bridging social capital means the institution and its mechanism in a community. While linking social capital is the relationship between various social levels and social status in society [6].

Bonding social capital specifically can be interpreted as the relationship between individuals with the same demographic characteristics as family relationships and kinships which can be forms of cooperation from relationships in a more homogeneous group. This homogeneous group has an impact on the high level of cooperation in the local community because of the similarity of the original characteristics left in the same area [8].

Social capital generally has a function as a tool in resolving conflicts within society, can encourage community participation in the form of solidarity as a pillar of volunteerism and contribute to the establishment of social integration. On the other hand, social capital can function as a form of democratic society and can be a bargaining tool with the government. In order to make this function to be maximally felt by the community, at least three important elements of bonding social capital are needed, namely (1) trust (trust); (2) values and norms and (3) networks [9].

### *Social Capital in the Context of Disaster*

Social capital can be studied from several of scientific perspectives including in public management. The mechanism

and relationship among trust, norms and networks in social settings in an area is the concept of social capital itself [6]. These values are developed in the concept of disaster management. People in disaster-prone areas usually adapt to developing a type of survival strategy based on the resources they have including social capital [10].

Social capital as a concept in disaster management has been developed for a long time in Japan in the face of earthquake and tsunami disasters. Social capital, when properly developed and applied, has a very large effect [11].

Studies of social capital in disaster management have been carried out in several regions in Indonesia, each of which provides an overview that the perspective of disaster management will be different in each region and the type of disaster faced.

## II. METHODOLOGY

The research was carried out with qualitative methods using various sources of data and information (multiple sources of data) including in-depth interviews, field observations, official reports or archives, scientific literature, and other documentation and sources.

Data analysis goes simultaneously according to the cycle in the Operational Component model namely data reduction, data presentation, and conclusion drawing and data verification [12]. This process takes place continuously as long as the research continues until the data is actually collected.

This study was conducted in June-August 2018. At the time of the flood exposure of Lake Tempe in the period of 2018. The criteria for key informants to be constructed in this study were informants who faced flood problems exposed both directly indirectly. The informants did not have the motive of both political and other interests to the problem. The number of informants is adjusted to the data requirements needed or until the information obtained has met the data validity criteria and represents all components that are in direct or indirect contact with the floods that occur.

## III. DISCUSSION

The result of exploration of bonding social capital in handling flood exposure of Lake Tempe is as follows.

### 3.1. Culture, Religion, Customs and Language

Community culture generally shows acceptance or adaptation to exposure floods that are routinely faced every year. It is shown that every life side in the community shows readiness and anticipation of this flood exposure. For example, at a wedding or death, the time of a wedding day usually refers to the time when floods usually occur. Even if a wedding is held during a flood, the community already has another planned plan that can be to be moved to another location that is considered safe to be reached by the invited relatives.

Likewise, if there is a death during a flood, the community already understands what things they have to do both in the funeral home and where the funeral will take place.

All religions embraced by the community are Muslim. Almost no adherents of other religions or beliefs are found in the study area. The mosque that becomes a community house of worship was designed by considering the routine conditions of floods that occur every year.

The community still holds the habit of not earning a living on Fridays, especially those who work as fishermen. As a form of appreciation for Friday prayers held together. Customary sanctions are also still being applied by *Macoatappareng* (the fisherman leader of Lake Tempe) for the community.

Another habit people hold is to recognize natural signs when a flood arrives immediately. These signs were studied and applied by the people as a preliminary preparation to welcome the arrival of flood exposure. These signs include: (1) usually rain will fall in a row in a week or more; (2) the sound of frogs began to be heard a lot; (3) river currents start to swell from usual; (4) ants start climbing people's homes; (5) usually 10 days after major flooding on the island of Java (6) the appearance of certain constellations understood by the people as a sign of the flood season; (7) a collection of clouds seen under the full moon; (8) the way birds enter their nest; (9) bamboo shoots are bigger than the mother; (10) heavy rains on 1 Muharam in Hijri year.

Bugis language is spoken in daily communication, including in cultural events. However, sometimes Indonesian is also spoken at the events considered a bit more formal.

When flood exposure happens, the homogeneity of culture, religion, settlements, habits and language greatly helps the people in the face of flood exposure. Either information or actions related to flood conditions are easier to communicate due to the homogeneity.

### 3.2. Livelihood

Fishermen are the main livelihood of the people in the research location. It can be said that every house in the population has at least one family member who works as a fisherman in Tempe Lake.

In conditions of flooding, local residents indirectly have water/ boat transportation. Boats are usually moored at the edge of the river to the lake, when floods happen, they can be moored near their homes.

From the recognition of local residents, it turns out that all houses have at least a boat that can be used when there is flood exposure. Boats have become the main needs of the people because they will be used every year. Their habit every flood season arrives; they have prepared their own boats. Repainting is usually done to make sure there is no problem in the boat.

Fishermen's life at the time of the flood becomes better, this happens because the area of their catches is wider and

closer to the settlement. In addition, previously dry areas become stagnant, enabling fish feed on sufficient food and the spawning areas become wider. If flood occurs more than a month, it can be ascertained that the number of fishermen catches has increased.



**Picture 2**

Fishermen in Lake Tempe

Source : Researchers' documentation 2018

### 3.3 Social Facilities and Public Services

Education and health facilities and public services in the study area are available. Schools, health facilities, mosques and government offices (*kelurahan* offices) are available at the location of flood exposure. These facilities are utilized by the residents both during normal and flood conditions. When the flood exposure happens, to social facilities and public services continue to be utilized by the people as long as the flood is still normal.



**Picture 3**

School Building in Flooding Time

Source : Researchers' documentation 2018

### 3.4 Social Norms

The social norms of the people are more or less influenced by the customary norms of Bugis and Islamic religion. Compliance and obedience to both government and customary leaders is still very strong in the daily life of the community. This is reflected in the obedience of the population not to make a living on Friday so that they can do Friday prayers. Another example is reflected in the norms of compliance in the conservation of fish caught by fishermen, namely the use of fishing gear that can damage the ecosystem of life in Lake Tempe will not be used. There is an obligation to help each



other for mutual and individual interests. This helps each other not only when there is flood exposure.

### **3.5 Legal and Customary Rules**

An unwritten rule when a flood occurs is the engine boat that is used must be turned off immediately after the boat enters the settlement area. This is done so that the waves generated by boat engines do not damage people's homes. The damage might cause the shifting of the position of the pillar of the house resulting in the house being collapsed due to unbalance. Boat engine noise causes noise that disturbs the people.



**Picture 4**  
Bamboo/ Wooden Bridge to Connect with The Residents' Stage Houses

*Source: Researchers' documentation 2018*

Another unwritten rule is that the terrace of a resident's house can be used together in the sense that if a connecting bridge is built from house to house, the residents voluntarily terrace/front porch of the house can be used together for pedestrian bridge connections during floods.

### **3.6 Settlements**

The architecture of the residential area is the stage house and floating house. This stage house concept is a community adaptation to the natural conditions faced. The stage house is built with an average height of 2 (two) meters or more above the ground level. Whereas floating houses are made by fishermen as temporary homes to rest on the lake while working.



**Picture 5**  
Residents' Settlement Affected by Flood Exposure of Lake Tempe  
*Source: BPBD Drone's documentation, Wajo Regency 2018*

This floating house will certainly not be affected by the tide or ebb of lake water. While the stage house will be affected by flooding if the flood conditions occur not as usual, which exceeds the stage of the stage house. The residents whose house floors submerged with water do not immediately evacuate, they make stages in the house. They prefer to stay in their homes rather than evacuate. They have prepared everything for flooding.



**Picture 6**  
Floating houses in Lake Tempe  
*Source: Documentation of Government of Wajo Regency*

If it happens where the flood conditions exceed the floor of the stage house, the residents work together to help make the stage inside the house. This is done to save furniture and homes so that it can still be inhabited. The residents were basically reluctant to leave their homes in flood conditions and were not used to evacuate only because of the flood exposure that occurred.

### **3.7 The Length of Time the Residents Settled**

Residents residing in the study location, averagely born and raised in the area. The migrants only exist because of the marriage bond so that they live in the area.

From birth to the present, residents have considered flooding as a routine even flooding is considered a time to strengthen friendship. Floods allow them to stay longer chatting at home, besides that with this flood condition, allowing other families in the surrounding area to come to visit just to enjoy the floods, touring while visiting relatives in the flooded area.

Floods make the population prosperous. This occurs because of limited population activity. Their main activity is working; after that they are more at home. They don't reckon most of the floods that make food staples hampered. In addition, the fishermen are easier to go to the lake because of their boats at home.

From the results of the study, it can be identified that the social capital bonding owned by people affected by flood exposure of Lake Tempe is a local wisdom that can be developed in shaping the resilience of communities facing disaster risks.

## **IV. CONCLUSION**

The community's ability to withstand flood exposure is bonding social capital. Bonding social capital of the

community has been formed for generations in the face of flood exposure.

This flood exposure is seen as an annual routine they face. Of the seven indicators of social capital bonding owned by the population illustrates that social capital has the role of reducing vulnerability and building community resilience due to floods in the exposure of Tempe Lake.

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