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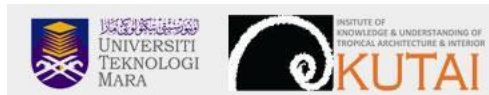
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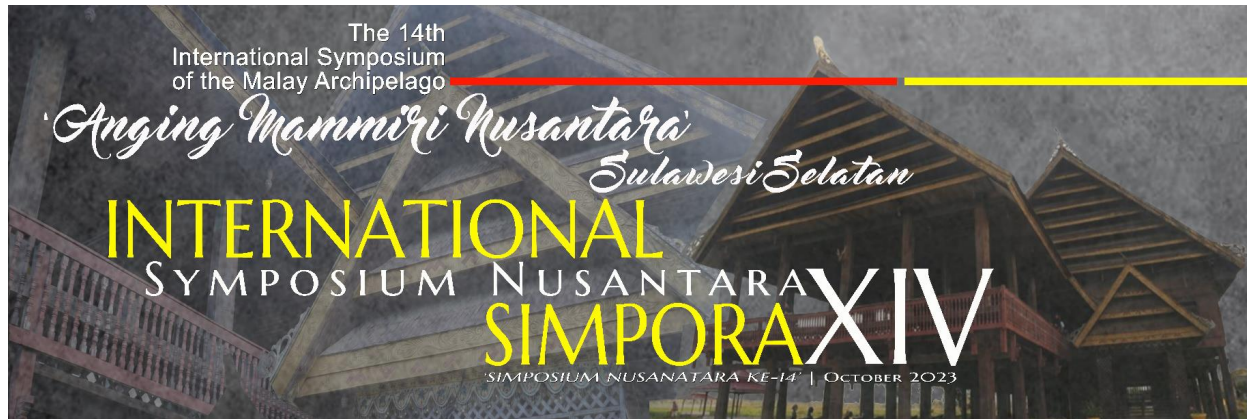
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## FLOATING HOUSE ON TEMPE LAKE IN THE REGENCY OF WAJO INDONESIA

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**Abstract:** This study aims to determine the development process of the formation of floating houses in Tempe Lake and the factors that influence it. The type of research is qualitative research whereby data is collected by means of field observation, interviews, and documentation. The data analysis techniques used are data collection, data presentation, data reduction, and conclusion drawing. The results showed that floating houses in Tempe Lake were formed as a result of the need for residential units that could bring residents closer to their workplaces. The factors that influence the formation process are the geographical conditions of Tempe Lake, climatic conditions, availability of local resources, social and economic aspects, technology, and traditional knowledge.

**Keywords:** Floating house, Tempe Lake, traditional architecture

## INTRODUCTION

Floating houses on Tempe Lake are a traditional form of housing that can be found around Tempe Lake. Tempe Lake is one of the largest lakes in South Sulawesi Province and is a very important natural environment for the local community. Floating houses are one of the unique aspects of community life and culture around Tempe Lake. However, recent conditions show that the number of floating houses in Tempe Lake is decreasing.

Nevertheless, this floating house is a traditional structure that has existed for a long time, and the knowledge surrounding it is passed down from generation to generation to ensure that the culture will not die.

A traditional house is a building that has its own unique characteristics such as a building structure, manufacturing process, form, and function, and is passed on to the next generation. Therefore, the purpose of this research is to find out the process of the formation of floating houses in Tempe Lake and the factors that influence it, so that the next generation can understand more about floating houses in Tempe Lake. Through this research, it is hoped that it will provide great benefits for the environment and the local community. It can also be the basis for developing better policies and practices that support the sustainability and well-being of communities in the region.

## **RESEARCH METHODS**

This type of research is qualitative research and the data collection method is by means of field observations, interviews, and documentation. The data analysis techniques used are data collection, data presentation, data reduction, and conclusion drawing.

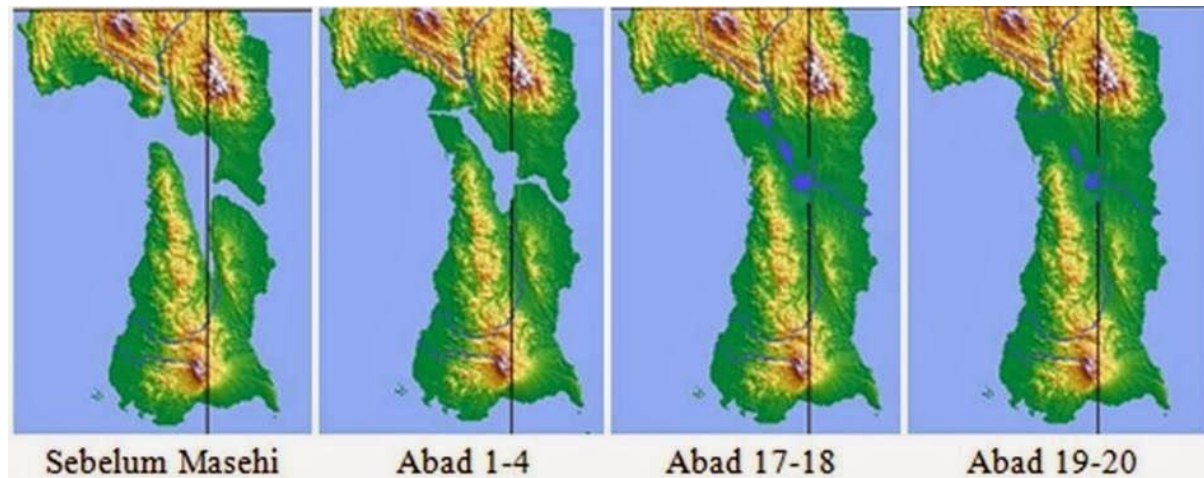
## **RESULTS AND DISCUSSION**

### **3.1 Research Result**

The process of the formation of floating houses in Tempe Lake, while closely related, is separate from the characteristics of Tempe Lake itself. Therefore, this research will discuss these separately.

#### **3.1.1 Tempe Lake**

Tempe Lake is located in South Sulawesi Province, Indonesia, and is one of the largest lakes in Sulawesi. The lake plays an important role in the ecosystem and the lives of local people. The history of the formation of this lake is related to geological and environmental factors. One study (Naing, 2019) explained that the changes in the physical geographical shape of the location around Tempe Lake include four stages as expressed by Ambo Tang Daeng Matteru. The four stages can be seen in Figure 1 below.

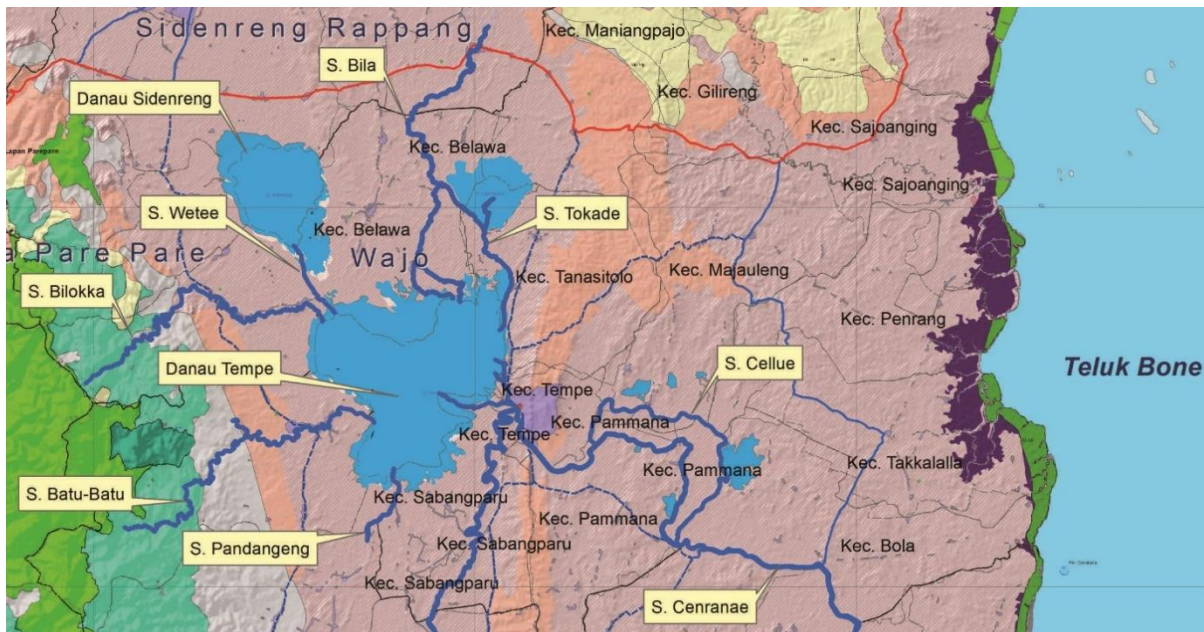


**Figure 1** Physical changes in the geography of Tempe Lake

Source: <http://orangecoklat.blogspot.com/>

The first stage was that the southern part of Sulawesi Island was still separated from Sulawesi Island by a strait that stretched from the Makassar Strait to Bone Bay. This condition is thought to have taken place in the pre-A.D. period. The second stage was when there was silting and narrowing at both ends of the strait to form a large lake. It is estimated to have taken place from the first century to the 16th century AD. The silting process continued until four sub-lakes were formed along with several other small lakes. This period is the third stage of geographical changes, which is estimated to have taken place from the 17th to the 18th century. In the fourth stage, in the 19th to 20th centuries, only four lakes remained, one of which was Tempe Lake. During this period, the route connecting the Makassar Strait with Bone Bay was completely cut off.

The siltation process described above is still happening today. This is directly influenced by the geographical location of Tempe Lake, which is surrounded by several rivers and becomes the estuary of these rivers (Figure 2). The direct influence comes from two directions, namely from the upstream direction, flowing several watersheds originating from three districts, namely Wajo Regency, Soppeng Regency, and Sidrap Regency, and from the downstream direction, in the form of the influence of sea tides from the waters of Bone Bay through the Cenrana E River. These two influences cause Tempe Lake to be characterized as a tidal lake (Sambu, Abdul Haris; Anwar, 2021).



**Figure 2** A snapshot of the watershed around Tempe Lake

Source: <https://id.pinterest.com/>

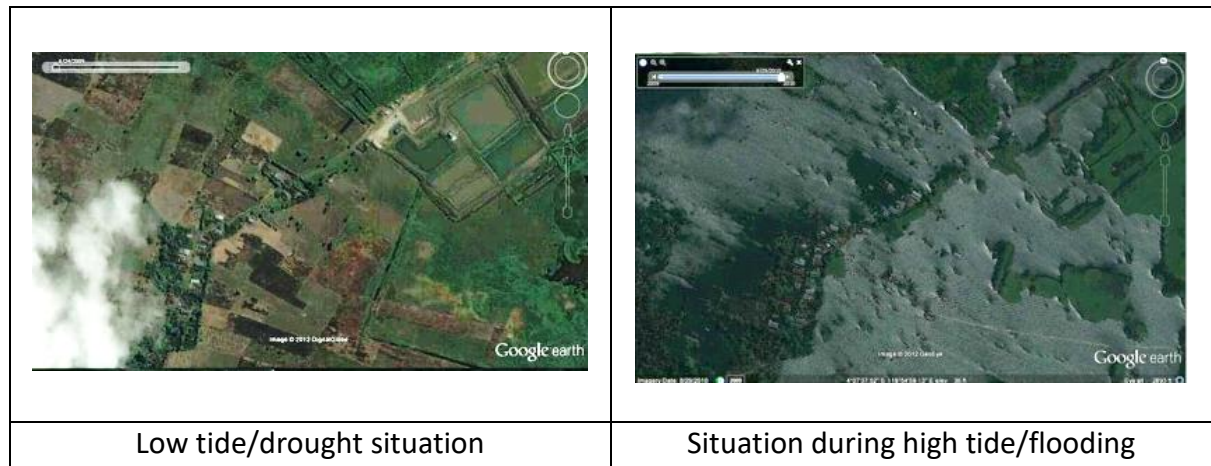
In Figure 2, it can be explained that there are two major rivers that flow into the waters of Lake Tempe, namely the WalanaE River which flows from the south and the Bila River which flows from the north and 26 other tributaries of various sizes (Sambu, Abdul Haris; Anwar, 2021). The outlet is the Cenranae River, which ends at Bone Bay.

As a lake that experiences periodic tides, its area and depth are dynamic, always changing according to the local seasonal period. Daud and Yunus (2017) said that water level fluctuations at high tide can reach around 2-4 meters and cover an area of 10,000 hectares, while at low tide, only 1,000 hectares remain. This unique nature is caused by the following two factors, namely:

- a. Monthly or seasonal tides, this condition is caused by local climatic influences, with high and low tides alternating with a duration of about four months each. The above is reinforced by Sambu, Abdul Haris and Anwar (2021) that the waters of Tempe Lake experience tides or rising water levels during the rainy season, both local rains and rains in watershed areas associated with Tempe Lake. It usually takes place from May to August. This tide or flooding usually lasts for a long time because of the imbalance between the watersheds that empty into Tempe Lake and the watersheds that drain into Tempe Lake. Meanwhile, the low tide is experienced from September to December.
- b. Daily tides, this condition is caused by the influence of global ocean tides. Sambu, Abdul Haris, and Anwar (2021) stated that the lake becomes tidal when the water discharge from Tempe Lake to the waters of Bone Bay slows down, especially if there is rain in the Tempe Lake area at the same time. Conversely, it recedes if it coincides with the receding



seawater in Bone Bay. This happens because the water discharge from Tempe Lake to the waters of Bone Bay through the Cenranae River is faster.



**Figure 3** Differences in water surface conditions in Tempe Lake

Source: <https://earth.google.com/>

Based on the explanation above, it can be concluded that the waters of Tempe Lake always experience tidal conditions due to several reasons. In addition, Tempe Lake functions as the estuary of several rivers in the vicinity, to then become the upstream for the Cenranae River to Bone Bay, the waters of Tempe Lake have water currents, which ultimately affect the floating houses in Tempe Lake later.

### 3.1.2 Floating House

Floating House consists of two words, namely “house” and “floating”. The definition of “House” in *Kamus Besar Bahasa Indonesia* is defined as a building for living, while “floating” means something that floats on the surface of the water or that can be placed in water and does not sink. Thus, the definition of a floating house is a building unit that functions as a place to live and is above water, floats and does not sink.

Based on the above understanding, a group of buildings located in the waters of Tempe Lake can be classified as a floating house. This can be seen from the activities that exist in the building, where the occupants of the building do activities and live in the building like a house. The shape that resembles a traditional Bugis house also marks it as a building for living.

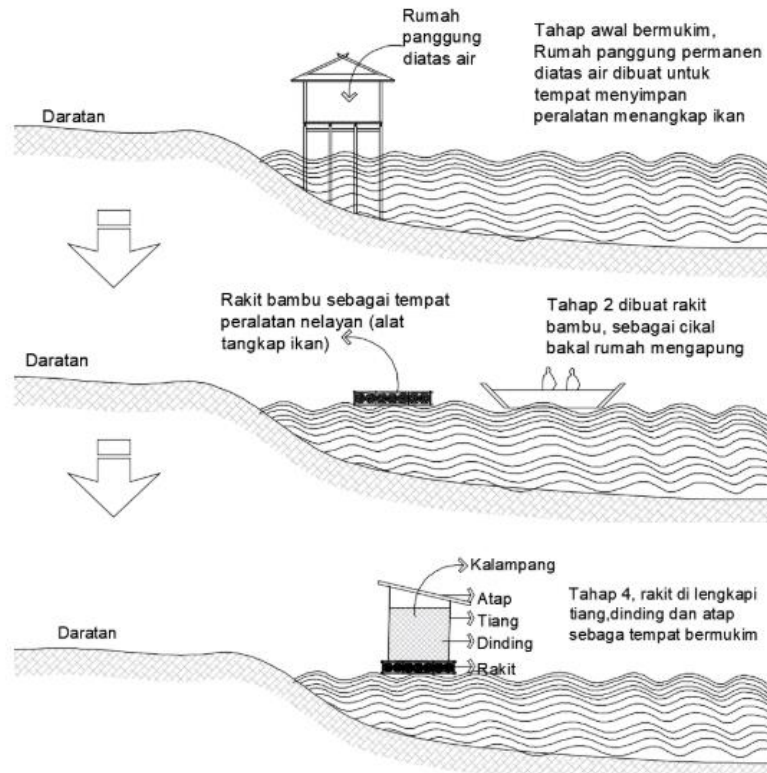
The position of the building on a bamboo raft, floating on the water, further demonstrates that it serves as a residence and floats on the waters of Tempe Lake. Therefore, a group of buildings on the waters of Tempe Lake can be classified as floating houses.



**Figure 4** Floating house at Tempe Lake  
Source: <https://makassar.tribunnews.com>

The existence of floating houses in the waters of Tempe Lake has been around for a long time. Its emergence is a result of the need to bring residential units closer to the location of livelihood sources to meet daily needs, especially as fishermen in the waters of Lake Tempe. According to Jumawan (2017), floating houses in Tempe Lake were first introduced by fishermen who fish in Tempe Lake. The house made by the fishermen is similar to the traditional Bugis stilt house. Naing (2020) stated that the floating house in Tempe Lake is one of the traditional Bugis houses with an environmentally friendly concept and can respond to the humid tropical climate.

Moreover, This house has the same shape as the traditional Bugis houses on the shores of Tempe Lake, but the poles are only 50 cm high and placed on a raft-shaped bamboo structure (Daud & Yunus, 2017). Like a traditional house, this floating house was also built using traditional methods and knowledge that has been owned for generations. The construction also uses materials that are available in the vicinity.



**Figure 5** The development of the Tempe Lake floating house

The use of rafts as the basis of the building has gone through a process of change according to the development of the needs of the fishing community at that time. As explained by Naing (2019), initially the community built a *kalampang* (semi-permanent shelter/dwelling made of wood/bamboo) as a shelter from heat or rain and a place to store fishing tools. The shape of this house is similar to a guard house found in rice fields, to protect rice from bird attacks. The *kalampang* is built permanently above the water by sticking bamboo poles into the slightly receding water. The distance between the *kalampang* and the fishing location in the middle of the lake made the fishermen start thinking about making a temporary shelter and a place to store fishing equipment. A raft made of whole bamboo stalks tied to a pole driven into the bottom of the lake was then constructed, so that fishing equipment and tools could be placed on the raft and easily carried across the water without bringing them back to the mainland every day.

The next development of the raft function is not only as a place to store fishing equipment, but also used as a place to rest, so that at the four ends of the raft are installed poles and given a cloth or plastic cover. Then the fishing community began to complete the raft by replacing the roof covering cloth with nipa and zinc material and adding walls made of bamboo. Along with the development of the level of civilization and community activities, the level of dependence of the fishing community on the lake is also getting higher. The simple shelter turned into a simple house on a floating raft is shown in Figure 5 above.

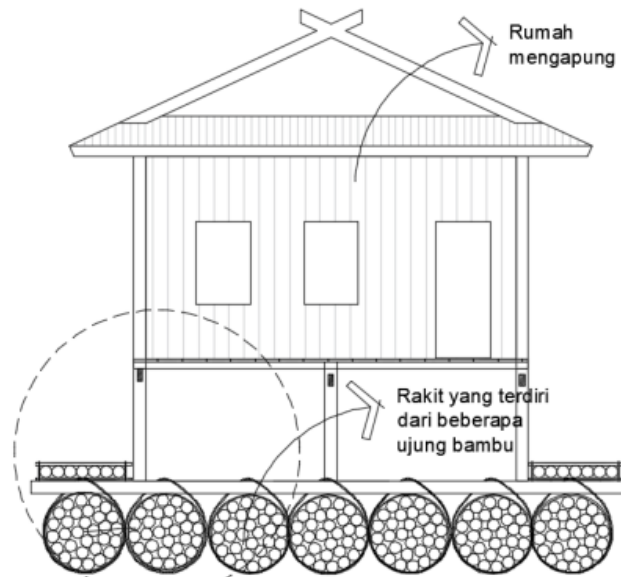
The residential structure of the float house has undergone changes over time. In the beginning, it was an economic necessity. Unconsciously by the people of Tempe Lake, this form of dwelling is one of the efforts to mitigate climate change. Changes in the structure of houses on the water in Tempe Lake are influenced by changes in the function of the house, changes in the characteristics of the natural environment which annually experiences floods and tides, climate change and local community beliefs. The evolution of the floating houses has proven that people in Tempe Lake can still survive there today (Naing & Halim, 2013).

The characteristics of lake water that often fluctuate throughout the year under different climatic conditions that tend to be extreme in the rainy or dry season, cause people to choose the raft system in the floating house structure. The system was chosen because the waters of Tempe Lake experience ups and downs in accordance with climatic conditions, i.e. during the dry season, some of Tempe Lake's waters will dry up, and during the rainy season, the lake water will overflow. This raft system makes it easy for the dwelling units to move following the water level where the house can still float. The movement of residential units follows climate change, where during the dry season, when the lake water begins to decrease, the community moves to the center of the lake, and moves to the edge of the lake during the rainy/flood season, when the water rises/overflows (Rusdi et al., 2021). In order for the house not to be carried away by the wind and currents, the house is anchored/tied to a pole located in front of the house (Naing & Halim, 2013).

Floating houses change locations by being pushed using 2 to 4 motorboats, one motorboat is on the side to direct where to moor their houses. The mooring of this floating house uses wooden poles with a length of 2-4 meters which are stuck to the bottom of the lake (Jumawan, 2017).

A floating house is a house on stilts with a lower structure made of rafts to create a microclimate within the building. The structure is spread out and not attached to the water, resulting in low temperatures due to high evaporation, creating a good shading system, and providing space for air to flow into the house. In addition, walls that do not have windows (wide openings) but have gaps or pores for air to flow proportionally into and out of the building, lead to more comfortable conditions inside the house. The use of rafts for the lower structure, coupled with a raised floor for air circulation is a way to avoid the heat of the tropical climate on the water. The high gable-like roof and its ventilation can absorb minimum heat in the dry season and retain minimum heat in the winter. Floating houses also use natural local materials, so they have good durability as a buffer against the extreme macro-climate of the above-water climate (Naing, 2020).





**Figure 6** The Shape of Tempe Lake Floating House

### 3.2 Discussion

The formation of floating houses in Tempe Lake is influenced by the characteristics of Tempe Lake waters and the needs of the fishing community. The waters of Tempe Lake, which receive inflow from several surrounding rivers and discharge into the Cenranae River as an outlet, have a fairly swift current. In addition to the large amount of incoming water compared to outgoing water, the waters of Tempe Lake often experience tides, which are also influenced by regional climatic conditions (dry season and rainy season) throughout the year. The vast water area of Tempe Lake often compels fishermen to search for fish in the middle of the lake, thus floating houses were built to provide fishermen with a place to rest and store their equipment and catches. Over time, the floating house has evolved into its current form—a structure resembling a traditional Bugis house on stilts, constructed on a bamboo raft for easy mobility according to the climate and water conditions of Tempe Lake.

The factors that influence the formation of floating houses in Tempe Lake are:

- Geographical conditions of Tempe Lake, including water depth, lake bottom topography and the presence of aquatic vegetation
- Climatic conditions, including rainfall and seasonal changes as well as changes in lake temperature
- Availability of natural resources, i.e. availability of local building materials, diversity of fish and fishery products as well as materials for rafts and floating house structures
- Social and economic aspects, like local traditions and lifestyle, economic dependence on the fisheries sector and social structure and community life
- Traditional technology and knowledge, i.e. traditionally applied methods of making floating houses, traditional boat and raft technology, use of local materials and construction

## CONCLUSIONS

Based on the discussion above, it is evident that the formation of floating houses in Tempe Lake is a result of adaptation to the lake's water conditions and the needs of fishermen. Its current form has evolved through adaptation to climatic conditions, socio-economic factors, and the local community's knowledge level. The factors that influence the formation process are the geographical conditions of Tempe Lake, climatic conditions, availability of local resources, social and economic aspects, technology and traditional knowledge.

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Finished her undergraduate of architecture from Hasanuddin University, graduated in architecture from the Institute of Technology Bandung, and focused research design on old cities as tourism. And her Doctoral Student from Technische Universität Wien, Austria. focuses research on Architecture culture and Heritage. She worked at Universitas Negeri Makassar.



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Armiwaty is a Lecturer in Architecture Program Study at Universitas Negeri Makassar. A motivated professional with a blend of academic excellence, creative flair, and a track record of achievement. Dedicated and versatile professional with a passion for writing and research. Graduated with a bachelor's degree in architecture in 2000. A master's degree in regional planning and development in 2012 and currently continuing my studies in the doctoral program in architecture at Hasanuddin University with a research topic on thermal comfort in floating houses on Lake Tempe. I was awarded the Best Paper Award Presented in The Technical and Vocational Education and Training International Conference (TVETIC) Faculty of Education Universiti Teknologi Malaysia in 2016. The last article published in the Central European Management Journal Vol. 31 Iss. 2 (2023) is The Symbolic Meaning of The Essential Engraving and Its Placement in Mamasa Traditional Architecture.



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