

Vibration Spectroscopy Potential for Beef and Pork Extending Tradition: Design Criteria for Developing of Authentic Banjar Settlements on River Banks in Banjarmasin

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Abstract—Banjarasin city has the character of settlements along the river that reflects the concept of the authentic Banjar settlements on river banks as a product of Nusantara architecture's. However, the existence of these settlements began to lose their existence due to changes in life orientation from river culture to landed culture. To restore the existence of these settlements, the government of Banjarmasin city plans to develop these settlements into tourist villages with Banjar culture. This encourages optimization of existing potential by improving the quality of settlements that pay attention to various aspects in the context of the location being developed, such as environmental damage, water quality, and applicable regulations. Although there are many design criteria related to riverbank settlements in Banjarmasin, there are some aspects that have been neglected such as the cultural aspects of urang Banjar which are related to the river and Islam. This has an impact on the quality of settlements that reduce the level of kinship in the Banjar community. By using a force-based framework, the design criteria will be formulated by applying a strategy of extending tradition. The design criteria produced, cover various design aspects that are closely related to activities, order, form, building construction, supporting elements, and circulation patterns to improve the quality of the settlement, so that it can develop into a self-sustaining area with food security, energy sources, and the conservation area of Banjar culture.

Keywords—Banjar Culture, Conservation, Force Based-Framework, Nusantara Architecture's, Tourism Village.

I. INTRODUCTION

ACCORDING to the history of Banjarmasin City, many villages line or line the banks of the river that flows from Muara Bahan to the mouth of the Barito River, so the area is famous for the Banjar village. The existence of the villages grew after the establishment of the Kingdom of the Banjar Sultanate which developed into a trade center [1]. The character of the buildings contained in the houses includes lanting (floating houses) and houses on stilts with various supporting elements (See Figure 1) [3]. This is the result of the adaptation of Banjar settlements in the river banks by paying attention to physical and non-physical aspects [2].

However, the existence of these villages began to disappear because of changes in the mindset of Banjar from very concerned about the context of the tides moving to the paradigm of land relations paradigm [4]. Besides, according by Afdholi, currently, there has been a phenomenon in the community related to changes in the direction in the riverbanks, which face the river, now starting to face towards

the landed [3]. The changes that occurred in the authentic settlement with a typical Banjar building on the riverbank in Banjarmasin. Characteristics of buildings located on the riverbank are the identity of Banjarmasin city. The identity of a city is unique and distinguishes it from other city. This identity is a concept of the image adaptation there life [5].

To restore the existence of these villages, Fajar Desira (Head of Bappeda Banjarmasin) said on one of the www.republika.co.id news sites, the Banjarmasin City Government will develop these villages so that they become the chosen tourist destination by helping all cultures [6]. the water and various typical culture of the Banjar culture. Some villages that have begun to be built such as the Kampung Biru, Kampung Hijau, and Kampung Sasirangan. The presence of these villages became a spatial identity in Banjarmasin city, which was approved by Perwali of Banjarmasin No. 25 [7].

To ensure the sustainability of these settlements, Banjarmasin City Government has planned a connecting bridge on the mainland of Kalimantan with Bromo island, as well as building a permanent titian to facilitate community accessibility. Besides, the government also provides guarantees to the community to remain able to live in the area, without having to worry if one day they will be evicted. The government also began collaborating with academics and the community to be directly involved in the planning of the tourist village, to improve the economic, social, cultural, and environmental.

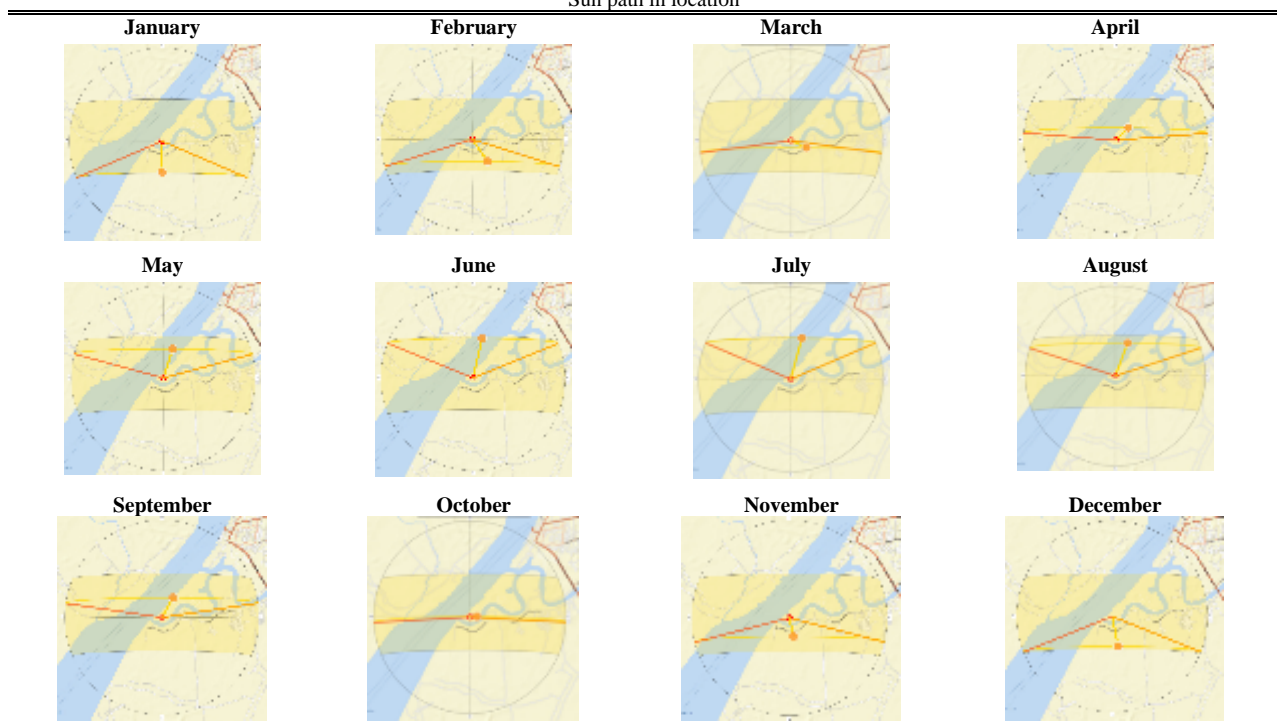
Considering the importance of the conservation of these various cultures, it is necessary to consider the concept of Banjar settlements living on the riverbank, both macro and micro through cultural discussions in *Nusantara* architecture's. Prijotomo, revealed the concept of conservation in Nusantara architecture's which was done by replacing damaged materials with renewable materials, a special material of wood which is one of the hallmarks of *Nusantara* architecture's [8]. This is feature that grows and develops with the times and technology, and is also a never-ending quest. Several strategies can be done to place *Nusantara* architecture's in nowday. According to Lim & Beng, four strategies can be carried out of reinvigorating tradition, reinveting tradition, extending tradition, dan reinterpreting tradition [9].

Some design on the banks of rivers or water that apply the culture of residence by the local community. As in the village



Figure 1. Overview of riverbank villages in Banjarmasin city.

Table 1.
Sun path in location



of Giethoorn (the Netherlands), the concept of living culture is closely related to air, related to accessibility in areas that can be passed by boats and bicycles only. Then, the concept of building in a common area with a vernacular style, wherein each dwelling there is a yard that is equipped with a small pier and bridge. Then, the concept of settlements related to other rivers is found in the Ampawa Floating Market (Bangkok, Thailand), which includes a trading area with architectural characteristics that form a floating market with several buildings on the banks of the river. The building has several typologies that are supported by footpaths and piers, so the interaction between sellers and buyers cannot be controlled by the building. Meanwhile, in Ko Panyi (Thailand), a fisherman settlement in the air, the people are migrants from Javanese who adhere to the Islamic religion, thus affecting the pattern of community life. This affects a variety of daily activities and culture of the local community. In this area, the mosque is a generator for the area, as a place of worship, participate and socialize. While various buildings in the area

are a blend of Malay architecture and Nusantara architecture. Related to the diversity of archipelago architecture, including the Tempe Lake Floating Settlement (South Sulawesi, Indonesia), consists of Bugis floating settlements made from a series of 3-5 boats. This house was built using local materials and worked together in cooperation. There are various rituals in the construction of this house as one of the cultural representations of the Bugis's. One proof of the existence of the architecture of the archipelago that can be resolved with the environment and the time required in Kampung Ayer (Brunei Darussalam), including the residential districts of Malay residents who are above the air. The originality of settlements in this village is still very strong, it can be seen from the materials used in each dwelling and various other supporting facilities. Although it has been developed with the latest building technology, but the culture of settlements in the region is still permanent and sustainable to this day.

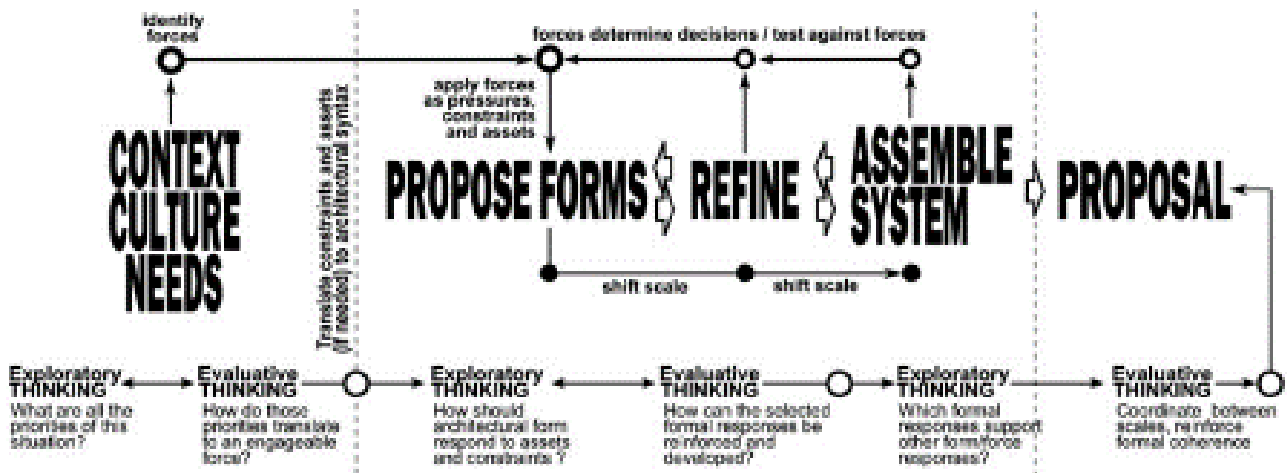


Figure 2. Process diagram of the force-based framework.

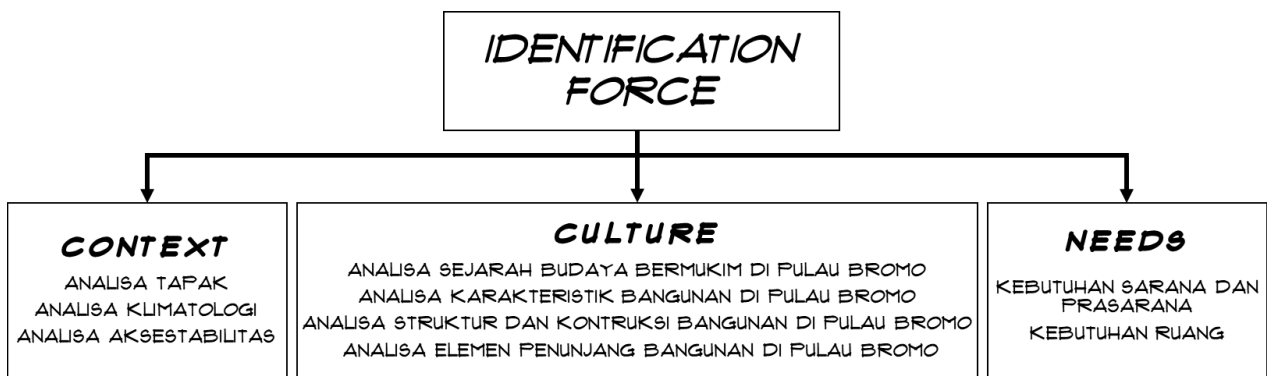


Figure 3. Aspects analyzed at the identification force.



Figure 4. Location of the design site of superior tourism village.

From some of the previously mentioned, spatial identity that exists in various cultures that exist in each region with different concepts, depending on the location designed, the intended target, and the design concept itself. In buildings preserved from this precedent, the use of structural systems and local materials is more dominant than structural systems and renewable materials. Likewise on the concept of form and function of buildings that are adapted to the context of the past. For this reason, there needs to be innovation in the use of renewable structural systems and materials, this is to answer the challenge of the difficulty of getting quality local materials. Besides, to improve the quality of the dwelling, there needs to be an improvement of the residential support system such as the provision of air conditioning and lighting systems following various considerations of the layout of the room, so as not to cause uncomfortable users.

II. APPROACH THEORY AND METHODS

The approach theories and methods in the criteria design. The following theories and methods are used.

A. Theory

Prijotomo, reveals that *Nusantara* architecture's are the culture and values that exist in society [8]. Cultural presence is changed by an outlook on life, environment, and needs (the instinct to survive and develop themselves), thus creating a relationship.

Mentayani & Prayitno, historically, the existence of the formation of communities on the shores can be divided into 2 groups [10]. First, people who have a tradition of settling and developing in locations on the edge of the air based on a

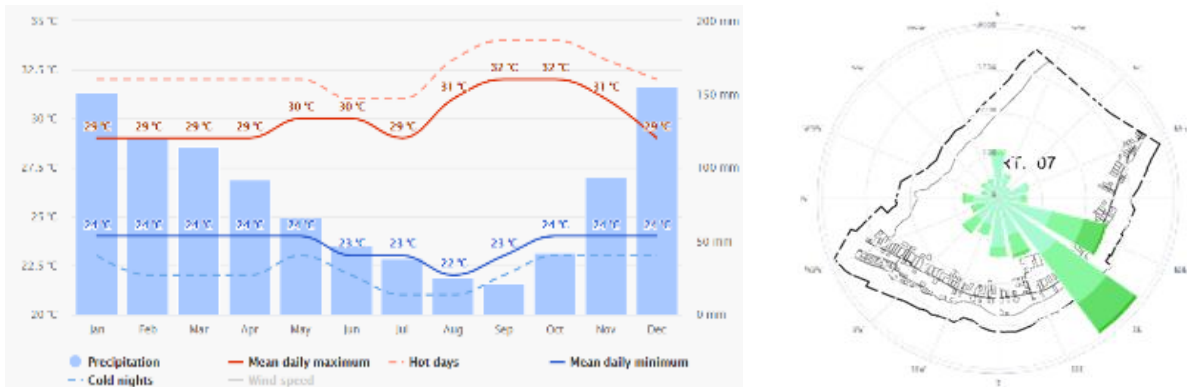


Figure 5. a. Average maximum and minimum temperatures in Banjarmasin City, b. Wind distribution in Banjarmasin City.

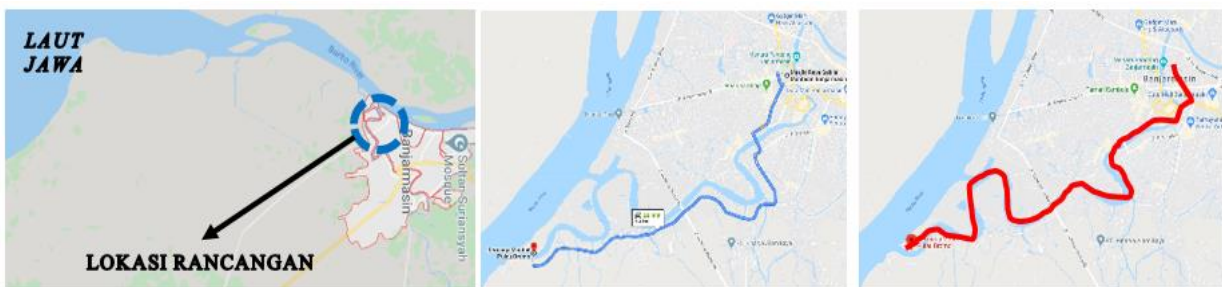


Figure 6. a. Planning to locations from the Java Sea. b. Access to location approvals by road. c. Access location meeting via river.

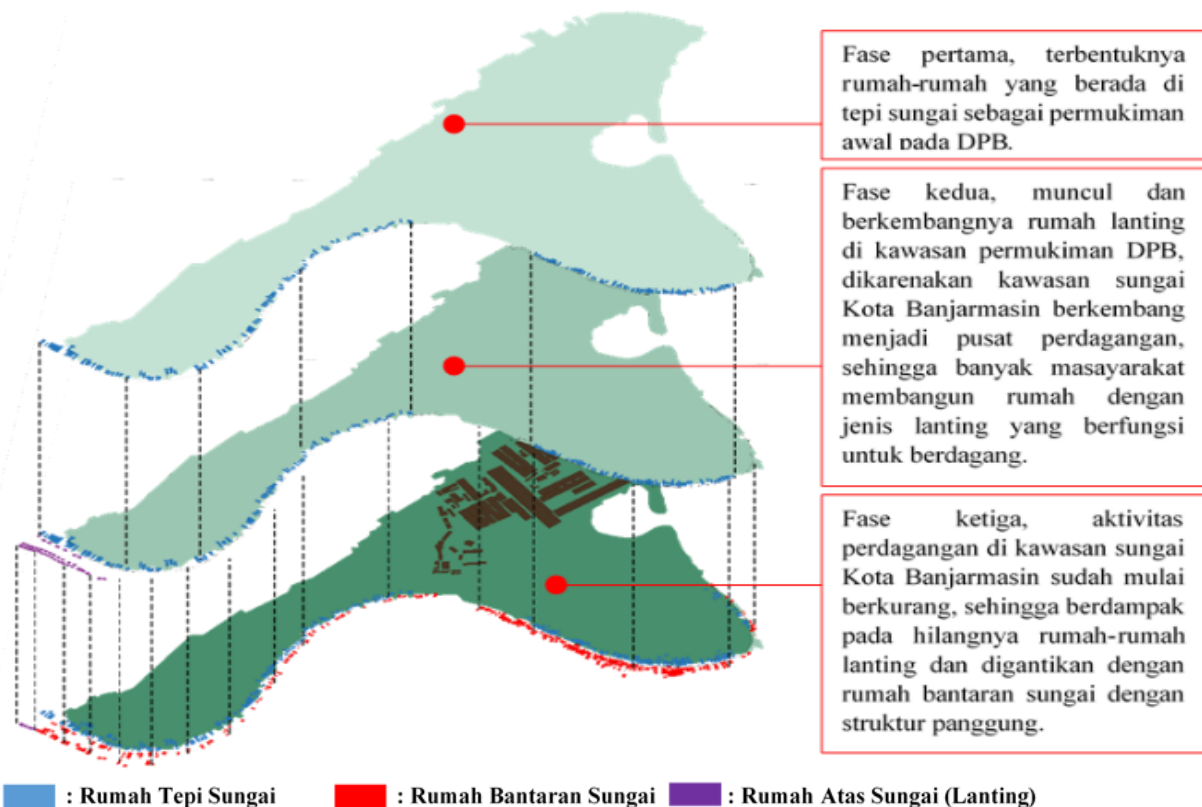


Figure 7. Development of settlements on Bromo island.

competitive culture. Second, the community groups that inhabit the edge of the urbanization process based on consideration of habitable culture on land limitations ('marginal' communities). The difference between the two groups that inhabit this riverbank creates a difference, the original group in the river bank which has a relatively homogeneous form of community composition and has a character based on the 'aquatic environment' (for example:

livelihoods, use of transportation modes, related service services with the river as an air source, to the form of traditional festivals, etc.).

Dahlhani states that the results of community adaptation to culture produce settlements located on the banks of the river with various supporting components, such as lanting houses, stilt houses, walkways, trunks, latrines, and walls, so that the population is concentrated in the riverbanks [2]. These

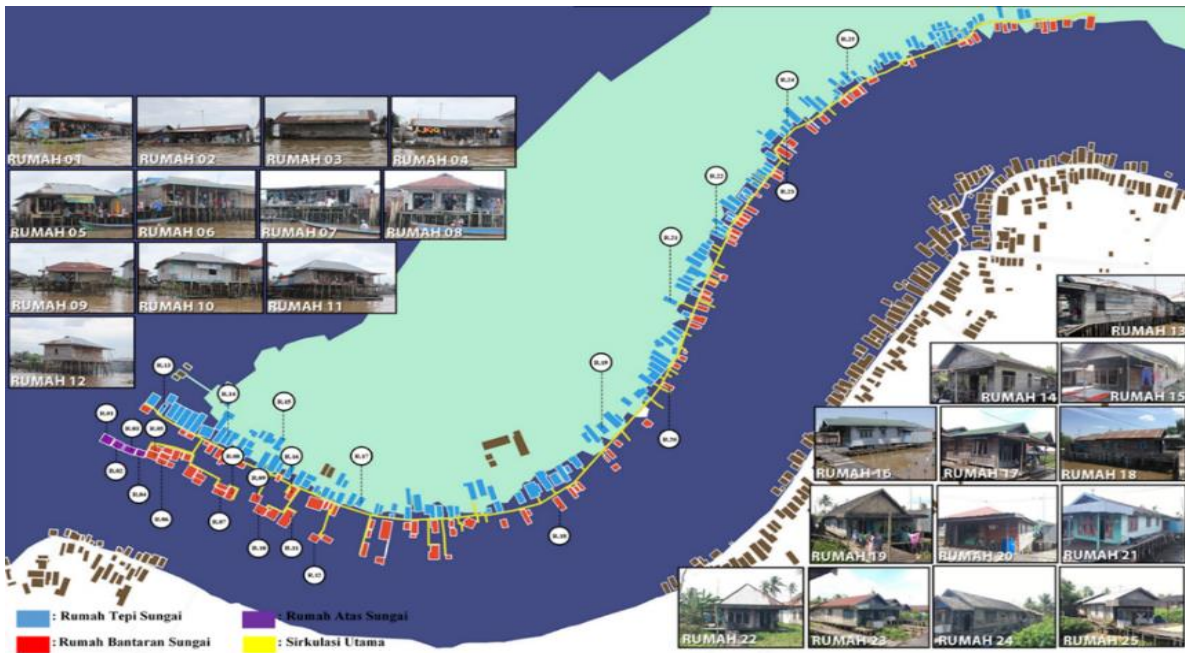


Figure 8. Building objects on Bromo Island analyzed.

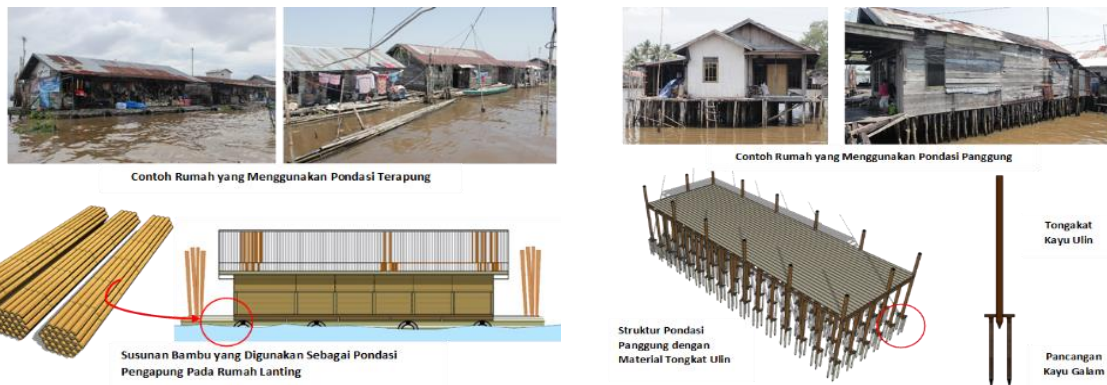


Figure 9. a. Use of a floating foundation, b. Use of a stage foundation.



Figure 10. a. Supporting elements consist of *Titian*, b. Supporting elements consist of *Batang*, c. Supporting elements consist of *Jamban*.

cultural products shaped of Banjarmasin City as a city with its river architectural character.

Lim & Beng, *Expanding Traditions* is a tradition that continues the tradition that has been forgotten by the surrounding community [9]. One way to create an architecture that is developed is by not forgetting local architecture, using local architecture as referred to in

contemporary architectural designs that are tailored to the needs of local communities. To present the past to the design that is useful for maintaining a culture. This is considered to represent the hopes and desires of the people to be able to have more decent housing, but it can also survive the past that is represented by the culture of Banjar settlements on the banks of the river and the region's history.

Table 2.
Synthesis of identification force (context, culture, needs)

Aspects Analyzed	Results	Conclusions
<i>Context</i>		
Located Design Objects	<ul style="list-style-type: none"> - Located in Tidal - Areas Main Functions of Areas in the Form of Green Open Space - Relatively High Rainfall 	<ul style="list-style-type: none"> <i>Asset</i> <i>Constraint</i>
Climatology	<ul style="list-style-type: none"> - The difference in Temperature and Minimum and Maximum High to Higher - The distribution of winds from Southeast Arakh is quite high and sometimes results in whirlwinds. - The circulation of the sun in April-September is above the equator, October is exactly at the equator, and November-March is under the equator 	<i>Pressure</i>
Accessibility	<ul style="list-style-type: none"> - Diplomacy Access to location through by road and river - Circulation on the site using titian 	<ul style="list-style-type: none"> <i>Asset</i> <i>Flow</i>
<i>Culture</i>		
History of Settlements on Bromo island	<ul style="list-style-type: none"> - Are Indigenous and Immigrants from the headwaters of the river - Settling because of High Economic activity - Faded Fence because No Longer Become the Main Line of 	<ul style="list-style-type: none"> <i>Asset</i> <i>Flow</i> <i>Opportunity</i>
Character Building	<ul style="list-style-type: none"> - Diversity character visual and spatial - Use of local materials into identity in buildings 	<i>Asset</i>
Structure and construction	<ul style="list-style-type: none"> - Has 2 structural systems, namely buildings and floating buildings. - The material used is generally ironwood, aloeswood 	<i>Pressure</i>
Supporting Elements	<ul style="list-style-type: none"> - There are supporting elements in the form of titian, batang, jamban, dan dermaga 	<i>Asset</i>
<i>Needs</i>		
Facilities and infrastructure	<ul style="list-style-type: none"> - The design of the tourism village design pays attention to the activity that is contained. 	<i>Flow</i>
Spatial Needs	<ul style="list-style-type: none"> - Spatial needs based on human needs and infrastructure developed 	<i>Flow</i>

B. Methods

The method used in this process uses the Force-Based Framework process diagram from Plowright (Figure 2) [11]. When each process starts with an exploration process, it is then evaluated to determine or find conditions that fit the purpose. The following is a diagram of the process (See Figure 2).

In the process diagram above, several stages are recorded, first determining the context, culture, and needs. Furthermore, the three aspects conducted a study of the strengths that exist in the region. Then, before being transferred to the process of making a partial concept, a transfer of coverage and assets are taken. Furthermore, this partial concept is evaluated and if it is suitable, a merger is made to make a proposal design.

While in this paper, the method used only reaches the Identification Forces (Table 2). The method used is the process of brainstorming, literature review and precedence analysis, survey, interview and questionnaire, then the synectic process as the design criteria [12-14].

III. RESULT AND DISCUSSION

Based on the design process used, the strength of the analysis. Strengths can be constraints, assets, flows, pressures, and opportunities. In this design, the cultural concept factors of settlements and site locations that depend on the banks of the river are used as strengths or boundaries (external factors) in making design decisions following consideration and analysis in the installation of literature.

A. Analysis

In the process of identifying strengths, three factors are needed as strengths or requirements in design. These three factors are context (context), culture (culture), and needs

(needs) [11]. Based on the related aspects related to this design as follows (See Figure 3).

The selected location is in RT. 007 / RW.002 Kelurahan Mantuil, Kecamatan Banjarmasin Barat, Banjarmasin City (See Figure 4), South Kalimantan Province [15-16]. In this location there are 90 housing units inhabited by 102 families, 20 houses are located on the river with 3 buildings consisting of *Lanting* houses. Besides, there were also 3 units *mushalla*, 1 unit school, 1 unit *Puskemas*, and 1 unit the *POLAIRUT* post. This area is right at the mouth of the Martapura river that flows directly into the Barito river.

Based on a map of the distribution of wind that occurs in the city of Banjarmasin, generally blows from wind Direction (see Figure 5) [17-18]. This condition can be moved by tornadoes in this area and buildings collapsed or the roof is flying. Besides, this wind repair also has an impact on the increased flow and flow of rivers that depend on the banks to repair erosion and repair damage to some buildings due to the waves crashing. In addition to being caused by waves, the building also suffered damage due to being hit by a tanker that was dragged by a river current. Under these conditions, information about the relatively low temperature between temperature and temperature during the day and night. Improve the character of buildings that use wood with porous wall applications to reduce heat in buildings.

The location of the city of Banjarmasin which is near the equator. Also in the circulation of sunlight in Table 1 [19]. This has implications for the shape of the roof that uses gable or pyramid with overhangs to reduce sunlight radiation. Besides, do overhangs also for tritisan when it rains. This condition also affects the level of humidity and temperature in the region is quite high.

As the entrance of the city of Banjarmasin from the river route, Bromo Island has the main potential to be developed into a tourist area. Given the very strategic location, so this

Table 3.
Design criteria for process in proposed form

General Criteria	The Factors on Design	Design Criteria
Tourism Village Zoning	Function of Area	- Zoning for the conservation area along the river and develop area on the river.
	Historical Area	- Zoning of protected areas was developed with consideration of the history of the area.
	Wall	- Materials wall preferably using wood or similar material - Wall color diutamakanalami - In ornamending can be ignored
	Roof	- Roofing materials preferably using thatch/reed or similar material - Color roofing preferred naturally - Form roofing preferred can provide imagery its maximum
	Door	- Material door preferably using wood or similar material - Colored door preferably natural
	Door model for reviews residential and commercial distinguished	
Characters Visual of Building	Windows	- Material window preferred using wood or similar material - Window color preferred - Natural setiapscontents that are connected to the outside area must have the window
	Ventilation	- Material preferred using wood or similar material - Ventilation preferred natural - Area with each side must be connected affairs ventilated
	Facade	- Acade created different composition for a review of residential and commercial - The facade depth can be positive space - For a review rhythm created different residential and commercial - Pro portion of the facade is set operating modular
	Building Plan	- Building form plan for review Occupancy Made with an elongated and widening pattern - Floor plan form for commercial review Made with the widening pattern of
Spatial Character of Building and Environment	Building Mass	- Orientation building facing the river - Inter-building has a relative distance far away for the anticipation of natural disasters and fires.
	Structure and construction	- The structural system uses the floating materials used are environmentally friendly and inexpensive for residential use.
Structure construction and	Dermaga	- Dermaga for the natives and tourists must be protected - The material is adjusted for its function
	Batang	- Each building located above the river must have a Batang - The material can be used as a fuction
	Supporting Elements	- As the main access for pedestrians, so it needs a width that can be adjusted to the original community and the tourist
Supporting Elements	Titian	- Titian must be equipped - the toilet must pay attention to access to achievement
	Jamban	- Waste from the toilet must be environmentally friendly - the material must provide privacy and protection from nature.

area will be directly visible from the Barito river path. (See Figure 6) [20]. To get to this location, it can be done with the mode of transportation, namely transportation routes and river lines. If using land transportation, it takes 25 minutes from the city center to the Mantuil pier, then take the ferry crossing or kelotok to the Bromo Island Mantuil pier. While using the river route, it can be reached within 45-60 minutes from siring of Pierre Tandean with kelotok.

The history of settlements on the Bromo island begins with the establishment of residential houses located on the banks of the river or more towards the mainland location and facing the river. In the 17th to 18th centuries, its development increased trade in the Martapura River in Banjarmasin City, furthermore, this development also impacted people on the Bromo island. Early lanting houses were only built in front of houses on stilts, lanting houses were designed as a place for residents of new stilt houses to sell. In further developments, lanting houses in this area are increasing, the community began to build more lanting houses protruding into the middle of the river and facing the initial position of the lanting houses in front of the residents' homes. Around the 90s, trading activities on the Martapura River began to decline as the development of the Banjarmasin City government was more

inclined to land infrastructure, so people began to switch to land areas (See Figure 7) [3].

Based on the previous discussion regarding aspects that will be analyzed in this design includes visual characters (walls, roofs, windows, ventilation, doors, and facades) and spatial characters (floor plans and patterns) mass). When the analysis is carried out to study which developments and changes occur in architectural objects based on the results of the thesis research from Afdholi [3]. The following building objects will be analyzed in this design, (See Figure 8).

Then, the condition of settlements that depend on the riverbank is very decisive to the residence or home for the people who live in these settlements. The house was built by considering the environment that allows this settlement, so forming a house in this settlement is very dependent on the river environment. The shape of the building, the construction of buildings, and the use of building materials are aspects of the house that are determined by the environmental conditions of the river. Site constraints consisting of low soil carrying capacity and required by river water can be well anticipated by local communities. The use of the type of foundation stage and floating foundation makes choices for the community in building houses. Use this foundation

system to respond to and agree with the river environment.

Floating foundations are usually used in houses above the river or called *lanting* houses. This foundation is used as weight support and also as a floating device for *lanting* houses. The use of floating foundations is very responsive to the river environment, does not oppose or impede river flow, even the use of a floating model house can also reduce erosion or soil erosion caused by river flow (See Figure 9.a) [3].

In addition to the floating system, there is also a foundation system used by houses in these settlements with stage type (See Figure 9.b) [3]. The houses that use this foundation are in the area along the riverbank. Stilt houses generally depend on the transition area between rivers and rivers, so the land in this area is muddy and watery swampy land, so the use of foundations must be devoted to building riverbanks.

The use of this platform foundation uses stick materials with lengths varying between 1-2.5 m², so the distance between the floor of the house and the river (see Figure 9). This height adjustment is seen from the tide of the water mountain, the height of the house being built can be adjusted. At the bottom of the ulin stick required a galam wood rod made as a mud binder so that the ulin pole did not continue to enter the mud soil.

Use the foundation of this stage so as not to obstruct the flow of the river, besides, it is also necessary the distance between the river and the building is one way to get comfortable in the area inside the house during the day, associated with the wind that can pass under the area under the house and on the connections floorboards in the house that provide comfort in the area in the house

Riverbank settlements on the Bromo island are riverbank settlements that involve the river in daily activities, meaning economic activities such as buying and selling, social interaction between communities, MCK, and as the main transportation route. Supporting elements are a form of response to the environment and as a link for the residents of the house with their environment. There are 4 types of supporting elements found in houses in the settlement of Bromo Island, these supporting elements are *demaga*, *titian*, *batang*, and *jamban* (See Figure 10) [15].

B. *Synthesis*

Based on the analysis related to context, culture, needs that have been done, it can be concluded that each of the aspects studied has various potential and complexity. The following synthesis is related to various aspects that have been analyzed.

C. *Design Criteria*

Based on the results of the analysis, theoretical studies and studies carried out, there are some specific suggestions in this design. Based on this specific criterion is a basic assessment to explore related to history, building characteristics, structural systems, and building construction, as well as its supporting elements developed through a strategy of extending traditions, for the conservation of the original inhabitants of Bromo Island and facility development [2]. The following are the strengths/ specific criteria that are needed in designing singers, namely:

1. Tourism design that is on the banks of the river so that in the design must pay attention to the applicable regulations, the use of space and territory, as well as river tidal conditions. Besides, consideration needs to be given to making the river the main path for circulation in the region.
2. Characteristics of buildings that have sustainability as cultural representations that require environmental and economic factors, so that the preservation of settlements can improve economic conditions and environmental quality by taking into account the daily activities of the community. Meanwhile, the provision of facilities for accommodation of superior activities will be adjusted to the needs of urban communities.
3. Limited natural resources available and relatively high prices on local materials are needed in this design process. Materials need to be renewed.
4. The supporting elements of the area need to be considered carefully so that they can accommodate the daily activities of the local community and tourism activities.
5. Space requirements for the number of occupants in each building.

Based on general criteria and specific criteria that have been agreed upon previously, several criteria will be announced to be discussed in the process Forms proposed to make it easier to create concepts following the specified factors, (See Table 3).

IV. CONCLUSION

Some of the strengths gained during the process related to the concept of culture living on the banks of the river referred to determine the assessment criteria used to produce the design criteria. From these results it was found several steps that could be taken to develop the area into a leading tourist spot, namely supporting one of the strategies abstracted from updating vernacular architecture by Lim & Beng [2]. As is the case concerning this strategy is to include the principles of modern architecture such as the use of concrete materials and ornaments that are removed for better cost savings and building durability. From the process carried out from the excavation of analysis, exploration, evaluation, and development of the tourism village through the strategy of expanding tradition, the following conclusions are obtained: (a) There are several steps applied to the design of this tourist village following the strategy of expanding tradition, namely to transform the shape of the roof to look for the material, to carry out the transformation of the opening elements of the door, window, and ventilation to be adjusted based on a review of the climate. Then the area is also developed through the creation of a floating green area (green pods) as a medium for planting; (b) Design criteria created during the analysis process are results that can be applied today for the next 5-20 years. While optimized considerations are buildings that must face the river, then build on those that must be passed to overcome the flood disaster and the tidal wave hit by the river water. Besides, supporting the visual character of buildings containing floating and stage buildings was developed to

restore the atmosphere of the Banjar settlement to the banks of the river.

ACKNOWLEDGMENTS

This paper was made to meet the graduation requirements of the ITS Surabaya architectural design master's degree. Thanks for all participants involved, especially to the two supervisors who spent so much time helping me complete the task.

REFERENCES

- [1] Listiana, Dana. *Banjarmasin akhir abad XIX hingga Medio abad XX : Perekonomian di kota dagang kolonial*. Pontianak. BPSNT Pontianak. 2011.
- [2] Dahliani, Setijanti, P. and Soemarno, I. *Tantangan Keberadaan Rumah Lanting Sebagai Arsitektur Vernakular Tepi Air di Banjarmasin*. Seminar Nasional - Semesta Arsitektur Nusantara 4. Malang: Jurusan Arsitektur Fakultas Teknik Universitas Brawijaya. 2016.
- [3] Afdholy, Amar Rizqi. *Tipologi Rumah Tepian Sungai di Muara Sungai Martapura Delta Pulau Bromo Kota Banjarmasin*. Tesis Magister. No publication. Universitas Brawijaya, Malang. 2019.
- [4] Kusliansjah, K. *Konsep Arsitektur Kawasan Sungai Pasang Surut Pada Era Pra Kolonial Dan Kolonial Di Kota Lama Banjarmasin*. Disertasi. No publication. Bandung: Universitas Katolik Parahyangan. 2015.
- [5] Fasli, Mukaddes. *A Model for Sustaining City Identity, Case Study: Lefkoşa (Nicosia) in North Cyprus*, Ph.D. *Disertation in Architecture*, Institute of Graduate Studies and Reserch. 2003.
- [6] Fajar Desira [Online]. https://www.republika.co.id/amp_version/05i413384.
- [7] Walikota Banjarmasin. *Peraturan Walikota No. 25 tentang Pengembangan dan Pengelolaan Pariwisata Berbasis Sungai*. 2016.
- [8] Prijotomo, J. *Prijotomo membenahi Arsitektur Nusantara*. Wastu Lanas Grafika, Surabaya. 2018.
- [9] Lim, W. S.W., and Beng, T. H., *Contemporary Vernacular : Evoking Traditions in Asian Architecture*, Singapore : Select Books, 1998.
- [10] Mentayani, I. dan Prayitno, B. *Arsitektur Tepian Sungai: Potret Life Style Masyarakat di Kota Banjarmasin*, Seminar Nasional Dan Workshop Life Style And Architecture Yogyakarta: Universitas Atmajaya. 2011.
- [11] Plowright, P.D. *Revealing Architectural Design: Methods, Framework, and Tools*. New York: Routledge. 2014.
- [12] Jones, J. C. *Design Methods: seeds of human futures*. 1970.
- [13] Mills, G. R. W., et al. (2015) *Rethinking healthcare building design quality: an evidence-based strategy*. Building Research & Information. Vol. 43
- [14] Zavani, M. N., Rahardjo S. *Pengaruh Setting Elemen Fisik Ruang Kantor Terhadap Produktivitas Kerja Karyawan - Studi Kasus: Kantor Redaksi Harian Umum Pikiran Rakyat, Bandung*. Jurnal Desain Interior & Desain Produk. Vol.1 No.1. 2016/
- [15] Pemerintah Kota Banjarmasin. *Rencana Tata Ruang Wilayah (RTRW) Kota Banjarmasin Tahun 2011-2031*. 2011.
- [16] Pemerintah Kota Banjarmasin. *Rencana Detail Tata Ruang Ruang (RDTR) Kota Banjarmasin Tahun 2013-2032*. 2013.
- [17] Maximum and minimum temperatures in Banjarmasin [Online]. <https://www.meteoblue.com/>.
- [18] Maps of wind distribution In Banjarmasin [Online]. <https://www.meteoblue.com/>.
- [19] Sun Path [online]. <https://www.suncalc.org/>.
- [20] Maps of Accesibilities [Apps Online]. Google Maps