

## Urban architecture identity of Banjarmasin: Structural pattern and building typology of the tidal river city

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received June 29, 2021 Received in revised form Aug. 12, 2021 Accepted Dec. 22, 2022 Available online December 31, 2022</p> <p><i>Keywords:</i> Banjarmasin Building typology City structure Tidal river city Urban architecture identity</p> <p><b>Corresponding author:</b> Yohanes Karyadi Kusliansjah Department of Architecture, Faculty of Engineering, Universitas Katolik Parahyangan, Indonesia Email: <a href="mailto:karyadi@unpar.ac.id">karyadi@unpar.ac.id</a> ORCID: <a href="https://orcid.org/0000-0002-8890-640X">https://orcid.org/0000-0002-8890-640X</a></p>	<p><i>Banjarmasin, known as the city of a thousand rivers, is an accumulation of multi-deltas sedimentation, located -0.16 meters below sea level and 23 km from the estuary of the Barito river. The city embryo, which acts as the western boundary between the Martapura river and tributary regions, is influenced by daily tides from the Java sea. The morphological structure and building typology formation of tidal hydrodynamics influence the characteristic of the environmental context identity. Furthermore, the life adaptation to the natural context identity is a unique traditional water-based culture on the physical, territorial, and cultural order, characterized by the physical, functional, and normative attributes from the pre-colonial to the colonial era. Therefore, this study aims to identify the architectural identity of Banjarmasin's tidal river city and its forming elements through a morpho-typological approach using an interpretive-descriptive-retrospective method. The results showed that the structural identity of the architecture of Banjarmasin environment, as a tidal river city, is fragmented in the form of many deltas, thereby leading to sedimentation from river tributary in dendritic and meander patterns. In conclusion, the people's life adaptation to the natural environment created a traditional water culture with four contextual building typologies of the tidal river, namely raft, water stilt, land stilt, and landed houses with underground reservoir.</i></p>

### Introduction

Banjarmasin is closely related to water and is known as the "city of a thousand rivers." It comprises 103 rivers, the three major ones being Barito, Martapura, and Alalak, as shown in [figure 1](#) (Badan Pusat Statistik Kota Banjarmasin 2014). This city is located on the eastern bank of Barito and is divided into two by Martapura. These two rivers are influenced daily by the dynamics of diurnal tides in 24 hours due to the hydrodynamic pressure of the Barito estuary and the Java Sea (Subiyakto 2004; 2005; Wyrcki 1961; Suhaemi, Raharjo, and Marhan 2018).



**Figure 1.** Banjarmasin, a city of thousand rivers  
Source: (BAPPEDA Kota Banjarmasin 2010)

The topography is dominated by lowlands with relatively flat alluvial plains and is -0.16 meters below sea level. This natural environment causes the river flow to be slow, forming a sloping groundwater basin (GWB) with broad watershed

characteristics as well as dendritic patterns and meanders (Kusliansjah 2015). Banjarmasin is an accumulation of multiple deltas from diverse river sedimentation (Kusliansjah 2015; Nawawi, Ruslan, and Aziddin 1986), and wetlands characterize the environmental conditions.

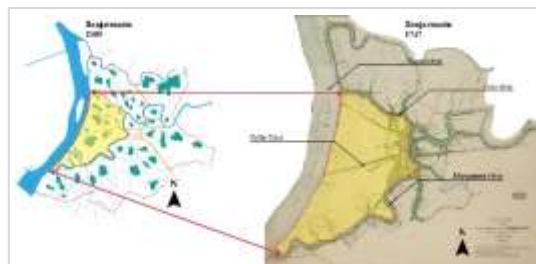
#### Banjar people's life

The characteristics of the natural environment influence the cultural civilization of the traditional Banjar people. Additionally, because this area is a wetland with upstream-downstream positions, the activity nodes are conditioned in the city. Furthermore, the people have adapted to the natural environment since the pre-colonial era, thereby making the tidal river a life generator with water-based culture (Mentayani 2008; Setiadi and Kusliansjah 2021).

The indigenes' social behavior is based on the entire water space, comprising estuary or downstream, upstream, body space, and river banks. This culture gave rise to the architectural identity of Banjarmasin, such as floating markets and ports, "geretak" wooden stilt bridges, and "lanting" floating houses along the Martapura, Kuin, and Alalak riverbanks.

#### Urban form of Banjarmasin City

Banjarmasin city encompasses several deltas formed by the confluence of the Barito and Martapura rivers (Sari 2008). During the pre-colonial era, the city grew above the tidal river, namely the Delta Tatas, and the areas along Kuin, Alalak, Martapura, and Barito, as shown in figure 2. Furthermore, the urban spatial pattern is formed from the position of rivers and deltas due to their accumulated developments.



**Figure 2.** Delta Tatas, the city of Banjarmasin  
Source: KITLV – (Kusliansjah 2012)

In the pre-colonial era (1526 to 1869), settlement nodes grew spontaneously along the river banks. Its organic patterns were caused by the natural environment as well as the people's

beliefs and customs. The planned development during the colonial era (1869 to 1945) depicted geometric patterns (radial-cobweb) of the city's structure. According to BAPPEDA Kota Banjarmasin (2010), these influenced the land plot structure, as shown in figure 3.



**Figure 3.** The urban structure form of Banjarmasin  
Source: (BAPPEDA Kota Banjarmasin 2010)

A city tends to form over a long period due to the accumulation of sediments at each developmental stage (Rossi 1984). It is characterized by environmental and cultural aspects. The dynamic physical-spatial phenomenon of the Banjarmasin produced a pattern of urban structure and adaptation, which became the cultural and architectural identity of the Banjar people's environment.

This study aims to identify the structural patterns, types, and systems that form the architectural environment of the Tidal River City of Banjarmasin and the architectural identity of the buildings. The results are expected to offer the following benefits:

- (1) Provide academic level to enrich the architectural knowledge of urban waterfront;
- (2) Enhance the practical level, which acts as a reference for drafting the physical-spatial design or architectural concept of the riverine city with local, ecological, and sustainable characteristics in order to face future challenges;
- (3) Ensure the generation will recognize and preserve the architectural identity of Banjarmasin as a tidal river city.

**Method**

This interpretive-descriptive-retrospective research employed a morpho-typological approach in collecting, processing, reading, identifying, analyzing, and synthesizing data. However, this method was used to obtain findings on the Tidal River city of Banjarmasin, especially during the pre-colonial and colonial era. The investigation was carried out in order to obtain an objective description (Notoatmodjo 2005).

Data and relevant information were acquired from literature sources, previous studies, and historical documents, such as maps and photographs. These were searched in two periods,

namely the pre-colonial (1526 to 1869) and colonial (1869 to 1945) eras.

The synchronic-diachronic analysis was conducted to decipher the urban form, place, human activities (Carmona 2021; Carmona and Punter 2013), and historical periodization of the city in the pre-colonial and colonial eras. The following process focused on evaluating structural arrangements, namely the physical, territorial, and cultural environments (Habraken and Teicher 2000; Habraken 1998), to obtain pattern, type, and system settings. Based on this analysis, the architectural identity of the Tidal River City of Banjarmasin was synthesized in figure 4.

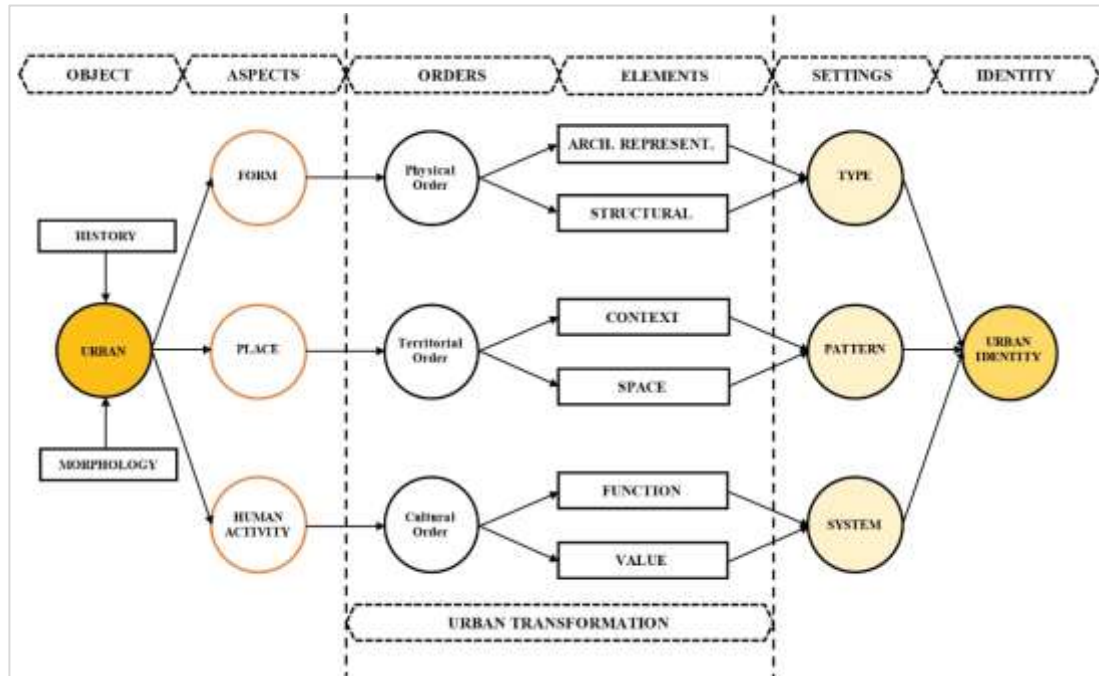


Figure 4. Conceptual framework

**Result and discussion**

Urban history

Banjarmasin (Delta Tatas area) has historically been the center of international trade due to its relations with several ethnic groups. This important role triggers opportunities for cultural intervention and acculturation between the local residents (Banjar and Dayak) and regional immigrants such as Malays, Javanese, Madurese, and Bugis. It also includes international immigrants, namely Asians

comprising of Chinese, Arabs, and Japanese as well as Europeans, including Dutch, and English. The potential factors for the city of Banjarmasin (Kusliansjah 2015) are:

1. It is located on strategic shipping routes from the Java Sea. In addition, the Barito river estuary has access to the shipping routes of Martapura, Alalak, and Kuin, to the interior of Kalimantan. This factor supports the city's development as a maritime transit center for international trade. Potential customers are

attracted by the wealth of Kalimantan's forest and mining products.

2. The development of Banjarmasin city, presently Banjarmasin is inseparable from the internal influence of Sultan Suriansyah (Prince Samudera), who ruled the Banjar Kingdom (founded in 1526 AD). This independent kingdom had its maritime-trade power in Kalimantan and was perceived as the main economic center till the end of the 18th century.
3. The Demak Islamic Kingdom in Java supported or influenced the establishment of the Banjar Kingdom. Interestingly, this was the first Islamic kingdom in Kalimantan.

Important events in the history of Banjarmasin from the pre-colonial to the colonial eras which significantly triggered the physical-spatial development and transformation of the city are as follows:

1. 1526: This city became an international trade center, majorly supported by its growing economy along the banks of the Martapura and Kuin rivers. The influence of external immigrants on the residents triggered acculturation and the transformation of the local architecture into an eclectic one.
2. 1826: the contract between the Dutch VOC government and the Banjar Kingdom (Ali 1965), which led to the division of Banjarmasin into two, gave the Dutch absolute authority over the Delta Tatas (Tatas Island). However, the Dutch VOC government got the territory south of the Kuin river, namely Tatas Island (Banjarmasin city center). This area was then used as the center of the Dutch military, trade, and shipping activities. The Banjar Kingdom was given the area north of the Kuin river. This includes Kampung Keraton on the Mesa river towards Kelayan, which became the center of government, trade, and shipping areas for the people of the Banjar Kingdom.
3. Tatas Island, as the center of the new administration under the Dutch government, was rapidly developed compared to the Northern area, which started to fade.
4. In subsequent developments, Tatas Island became the center of the new government under the Dutch. This was due to the area's rapid development on the banks of the Martapura river, leaving the Kuin region, the center of the Banjar Kingdom in the North, to fade. As a result, it was only used as a

residential area for the Banjar people, especially after the abolition of the Banjarmasin Kingdom by the Dutch colonial in 1869.

5. The Pre-Political Ethics Era (1869 to 1900): The Dutch East Indies Government from 1883 to 1890 built the city roads and canals. This was based on the local wisdom of the Banjar people in erecting various types of traditional canals, such as Anasan or Anjir, Handil or Tatah, and Saka (Subiyakto 2004).
6. Besides controlling the main shipping route (Martapura), the Dutch colonial also built "Fort Tatas" on the banks of the Martapura river, equipped with a port, lodges, and a hospital.
7. Post-Political Ethics Era (1900 to 1942): July 01, 1919: Banjarmasin city became the capital of Borneo, and an autonomous region, functions as Gemeenteraad Bandjermasin. Ir. Karsten, an architect, was involved in the development plan of this city.
8. Before the Japanese occupied Banjarmasin, a city scorched by the Dutch, several infrastructure and facilities were destroyed.

#### Urban morphology

The present study seeks to recognize the architectural identity of Banjarmasin through urban morphology. The determinants of this method are related to the milestones in the historical events that occurred in this city:

1. Rivers and wetlands characterize the erection of road structures. The city has two types of urban spatial patterns, firstly; organic form, based on the local wisdom of the Banjar people in building the traditional canal systems such as Anjir, Handil, and Saka. Furthermore, it is geometric in shape and has a cobweb radial pattern based on the city roads and canals built by the Dutch colonialists.
2. The Dutch Colonialists founded Fort Tatas for the defense and strategic management of the city. It is located at the center of the city on the Martapura river banks, connected to the road-canal axis of the Barito river, which is presently the location of the Trisakti ocean port. Fort Tatas effectively oversees the shipping activities on the Martapura and Kuin rivers. It also monitors ethnic squatter activities in the Martapura riverside which encompasses several villages, namely: Banjar, Antasan Besar, Teluk Dalam, Java, Chinatown, and Keraton Village.

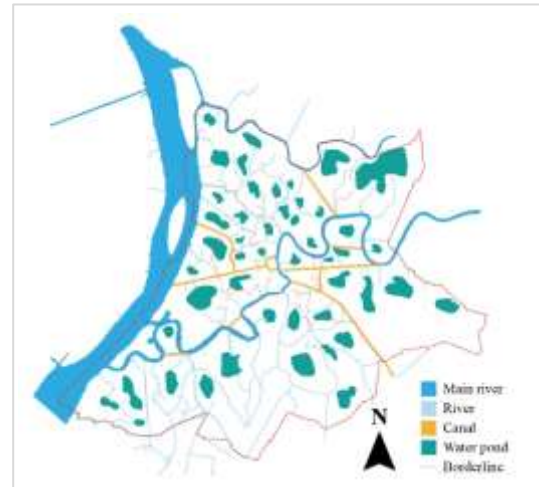
- The construction of the city road-canal axis passes through the port situated on the Barito river banks to the Fort Tatas in the city center, the Martapura, and Tepekong – Bilu axis now Veterans road. This effectively shortens the distance and accelerates the mobilization of transportation as well as city defense, as shown in figure 5.



**Figure 5.** Strategic route of Colonial defense in Banjarmasin

- The wikenstelsel provisions were enforced by the Dutch Colonial government in 1740. This led to the formation of an ethnic squatter-based community, especially for Chinese residents on the banks of the Martapura river opposite the Tatas fort, and those from Chinatown, Arabs, Malays, Bugis, and Banjar Villages. It is also perceived as a division of living areas within the city. The spatial layout of this community develops in respect to its ethnicity, adorning the cultural diversity of the city.
- The forest products industries and Kalimantan mines, using river networks and ports closer to the estuaries and the Java sea, caused the city to develop towards the West in the Delta Tatas.
- Urbanization of cities creates density on riverbanks, canals, and roads, thereby changing the spatial arrangement into a closed system.
- The development of infill spatial patterns in non-contextual cities adds to the density of urban spaces.
- The emergence of urban water pockets is due to the disconnection of the city's water system

and traditional "Saka" canal. Several of them are sold during land tenure for settlements and industries that are starting to grow (figure 6).



**Figure 6.** The waterholes in Banjarmasin

Physical order: Urban form and type

The adaptation of humans to a place is realized through a balanced process of accommodation and assimilation (Norberg-Schulz 1991). In this context, the position of the area, building relationships (linkage system), and diverse forms (typology), need to be considered. Urban form is a physical order identified based on the formation of its structure and type.

In the case of Banjarmasin city, the urban structure is formed from organic patterns influenced by river flow and geometric patterns. These, in turn, influence the pattern of urban land plotting.

- The Dutch East Indies Government first introduced the construction of roads. Ten canals were built in the center of Banjarmasin City. However, four of the five types were equipped with road construction. The traditional Banjar canals comprising Antasan or Anjir, Handil or Tatah, and Saka, were constructed on swampland based on local wisdom.
- Asides from the road construction shown in figure 7, the residents' activities were monitored in anticipation of rebellion.
- City structures and patterns were developed like a cobweb in 1883. These were concentrated in the Tatas area, then spread outwards by connecting linear streets to other activity centers. For example, to the West, Soetojo S. and Belitong streets are located

towards the Trisakti river port and traditional wharf, respectively. To the East, Veteran street is situated around the Tabuk River, and to the Northeast: A. Yani street is connected to Banjarmasin through the Upper riverine area and Martapura sub-district by land. Meanwhile, to the North, a road constructed in the 80s, connects the Marabahan and Central Kalimantan areas, previously dominated by river transportation.

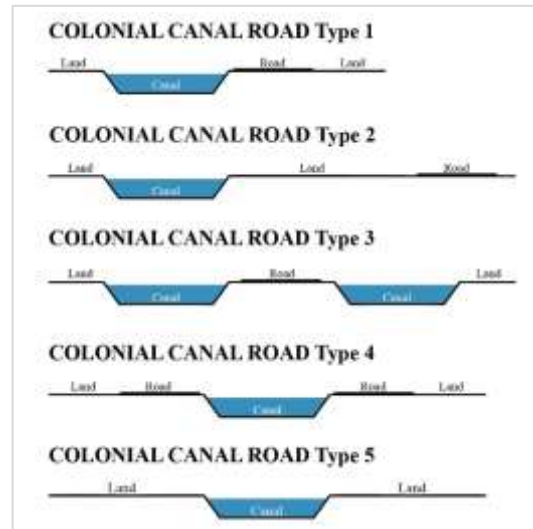


**Figure 7.** Traditional Banjar community canal-based road construction

Currently, people prefer land to water transportation because it is more developed. This is also supported by the notion that an area is considered underdeveloped if it is not connected by land transportation.

#### Architecture representation – urban type

Urban-type Banjarmasin city can be identified from the structure of the river-based organic pattern and geometric (radial-cobweb) form. Furthermore, it also forms canals, roads, and land patterns due to urban paths (rivers, canals, and roads), as shown in [figure 8](#). According to [Wijanarka \(2009\)](#), the land pattern types include: organic, perpendicular to the river bank, and road, as well as geometric, as shown in [figure 9](#) ([Kusliansjah 2015](#)).



**Figure 8.** Types of Banjarmasin's canals and streets in Colonial-era

Source: ([Wijanarka 2009](#))



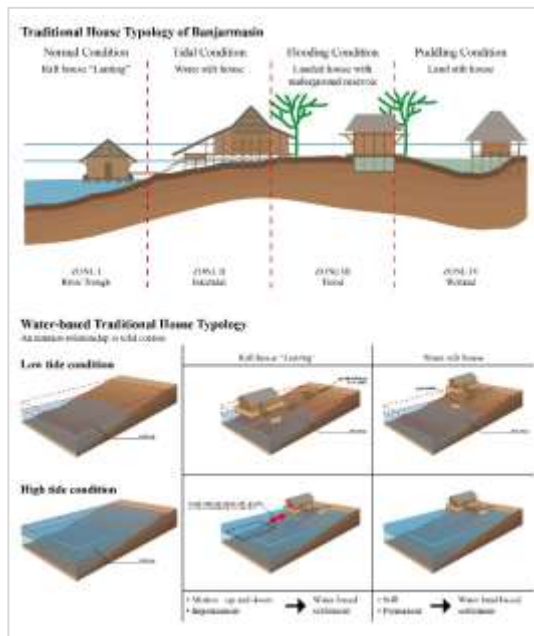
**Figure 9.** The organic and geometric land pattern of Banjarmasin

Source: ([Kusliansjah 2015](#))

#### Architecture representation - building type

The architectural building type of the traditional Banjar is a model of the tidal city structure. The ability to create a tidal space protects the building floor, piers, and bridges from being submerged in water. The architectural articulation is carried out by building a stepped courtyard for diverse activities and as a substitute for those submerged in water or swampy area. Moreover, it is also performed by constructing buildings that are widened to the left and right (*beranjung*).

The architectural representation of Banjarmasin city comprises rafts, water, land stilt, and landed houses, along with supporting elements in a tidal environment, as shown in [figure 10](#) ([Kusliansjah 2012](#)).



**Figure 10.** Building type in Banjarmasin  
Source: (Kusliansjah 2012)

The two types of raft and water stilt houses form an urban tidal space that manifests the Banjar people's local wisdom. The traditional floating house is attached to a gangplank (*geretak*), connected to the river bank, as shown in figure 11.



**Figure 11.** Raft house (*lanting*), a traditional house in Banjarmasin  
Source: KITLV

The *lanting* house is located on the Martapura river, Banjarmasin City, and is characterized by the following:

1. Gable-shaped roof.
2. Float pads from three large logs.
3. The floor is basically constructed on ironwood beams located on a floating foundation.

4. The walls are made of boards or awnings, such as woven coconut leaves and bamboo.

The groundwater architectural building types include high ridge and land-based stilt houses (figure 12).



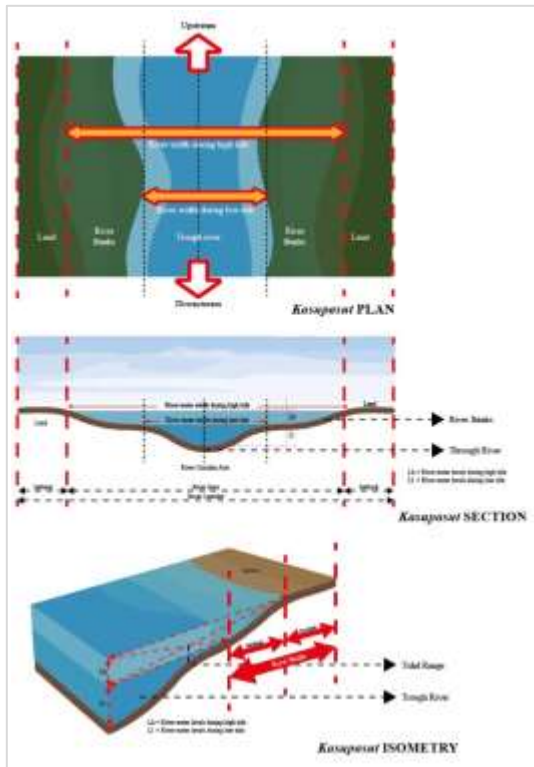
**Figure 12.** Land stilt house of Banjarmasin  
Source: (Mentayani 2008)

Territorial order: Urban place and pattern

The urban pattern as a territorial order (Habraken and Teicher 2000) in the city can be identified based on the residents' formation and usage of its space. It is a plot of land at the boundary characterized by the natural environment and the people's daily activities. Furthermore, territorial order and pattern in the urban place is depicted by how the traditional Banjar people habituate the river when carrying out daily activities.

Urban place: Urban context and space

Urban place is related to the physical spatial context of the city. In the city of Banjarmasin, this area is identified from the buildings' spatial layout and contextual architecture. This is in response to the dynamic space of the river tides, as shown in figure 13 (Kusliansjah 2015).



**Figure 13.** The dynamics of the tidal river in Banjarmasin  
 Source: (Kusliansjah 2015)

#### Urban place and pattern as a territorial order

The Banjar people are known for their mastery and adaptations to the wetlands, including the control of the river tides and lands, for example:

1. The ability to adapt to the river tides, shipping access to the estuary or downstream, and inland or upstream without using the pedal is some form of local wisdom. The presence of the floating market node area at the mouth of the *Kuin-Alalak-Barito* river is an indication of an ebb-based economy,
2. The capability to cultivate and engage in irrigation farming for tidal purposes using various indigenous territorial management systems, namely *Anjir* (regional authority territory), *Handil* (community territory), and *Saka* (landlord private territory) types.
3. Mapping of land parcels based on the water flow system is orientated perpendicular to the river as living space with footbridge access and tidal piers.

The ability of the Banjar people to adapt to their wetlands is also coupled with the local wisdom of the community's customary traditions in regulating the use of the environment.

#### Cultural order: Urban activity and system

Architectural phenomenology is a study that examines the soul of a place. In the Western world, it is known as *genius loci* (Norberg-Schulz 1991), referring to the intelligence of the local community in facilitating their activities and building the physical environment. However, through this approach, each place can be meaningfully assessed by its people. The study of the cultural order in cities can be identified concerning urban lifestyle activities (Urban activity - Urban system).

#### Human activity: Function – value

Rivers and tides led to the emergence of local water culture in the Banjar community. In the history of the Banjarmasin city, it was discovered that the inhabitants made the river the driving force of their life (Human activity: Function – value). It is used to provide support to relevant needs, namely cooking, cleaning toilets and water transportation modes, building ports, irrigation canals, and urban drainage. Several Banjar toponyms related to rivers and water can be found in its language dictionary such as *batang banyu* (river), *kuala* (muara), *taluk* (bay), *antasan* or *anjir*, *handil*, *saka*, as well as various types of traditional canals for water transport and irrigation processes as shown in figure 14.



**Figure 14.** Water-based culture of traditional Banjarmasin

#### Local wisdom -Urban system

The Banjar community accepts and uses the tidal context, which is revealed as the local wisdom values of the water culture through signs and symbols associated with communicating meaningful messages. Therefore, the Banjar people's social behavior depends on the estuary, upstream, and riverbank.

This collective memory marks the Banjar people's local wisdom in articulating their identity to the natural environment. Meanwhile, the people's water culture is evident in their daily activities related to river life. Various "jukung" (canoes) are found as a mode of water transportation used by the indigenes to travel.

#### Environment structure: Pattern-type-system

The environmental structure is divided into physical, territorial, and cultural environments. It denotes the diverse architectural types, patterns, and systems (Habracken and Teicher 2000), that can be synthesized as identities. Similarly, urban identity is formed by its types, patterns, and systems.

In accordance with the results obtained, structures that form the environmental architecture of the Banjarmasin Tidal River City have fragmentation pattern identity and many deltas. Meanwhile, the sedimentation process occurs from the dendritic river branches and meanders. This encouraged the Banjar people to adapt their natural environment, which led to the birth of a traditional water culture with four typologies associated to contextual buildings. These include floating buildings, water platforms, water-land stages, and land pockets of water.

#### Urban identity: Physical-functional-normative

Part of the Banjar traditional architecture is identifying the local culture of the Banjarmasin tidal city as part of the Banjar traditional architecture. This is carried out by analyzing the environmental structure of the tidal space and its transformation. Then, it is synthesized as an urban architectural identity. Meanwhile, three factors characterize the identity of the Banjarmasin Tidal River city, as follows:

Firstly, the urban physical identity is formed in response to tidal space and articulation of architectural orders. This includes the linear pattern of the tenuous building environment along the river bank and the stepped type in the water-land access to the terraced building plan pattern. Meanwhile, the typology of tidal architecture is the type of Banjar slanting (floating) and water stilt houses (standing) related to the system in the tidal space.

Secondly, the urban functional identity is depicted by how the traditional Banjar people habituate and execute their daily activities, as earlier described. Thirdly, the urban normative identity shown in the behavioral patterns contains

the values of Banjar's local wisdom. This is due to the response to living space on both water and land, wet and dry, dirty and clean conditions, lower and upper hierarchical positions, and the balance between left-right and front-back. Therefore, the traditional structure of Banjarmasin city, especially the old center as the forerunner, is articulated based on local wisdom. It is in line with the architectural articulation of the tidal water city, which has a distinctive identity in terms of patterns, types, and systems.

According to preliminary studies, the cultural civilization of the traditional Banjar people existed long before the influence of the West. Therefore, to interpret the urban identity, it is necessary to analyze it from two sides, from the Eastern and Western perspectives. A technology-based approach was used by the Dutch Colonial master to separate water and land.

## Conclusion

The morphological characteristics of Banjarmasin city started as an independent or maritime-trade kingdom. It developed as a major economic center in the field of politics till the end of the 18th century. Afterward, the kingdom was divided due to power struggles, especially after the Dutch intervention.

Adaptation and acculturation of water culture led to the following architectural identities of Banjarmasin city: (1) Physical environment contains natural identity, tides and dynamics of tidal space, which are built in accordance with the floating architectural type, water stage, water village, river port, and stilt bridge types; (2) Territorial environment comprises territorial identity with the land plot perpendicular to the river bank, boundary clusters, boardwalks, piers, and gates; (3) Cultural environment is a common Identity comprising of shared bath, and floating market with the mosque as the center of the environment.

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