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URBAN DYNAMICS OF RIVERBANK SETTLEMENT IN SAMARINDA CITY, INDONESIA

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Abstract

Economic change and government policy are the major factors that determine the settlement on the riverbank in Samarinda, which were originally determined by roads. The transformation problem arises due to economic development with an increase in land-based transportation modes. Therefore, this research aimed to analyze the urban dynamics of settlement based on the configuration and distribution of building masses on the riverbank. It used the qualitative method to determine the urbanity of settlement and the dynamic relationship between mass and environment that creates the morphological characteristics. The result showed that the riverbank settlement in Samarinda is in form of a dense structure due to the availability of limited land. The orientation of settlement persisted towards the river and land as the basis for daily activities. This research made an important contribution to riverbank settlement planning, especially in Samarinda.

Keywords: Urbanity; Settlement; Riverbank; Transformation

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INTRODUCTION

The large riverbanks in the city of Samarinda are presently characterized by settlements (figure 1). This was because in the Pre-Colonial era, community activities were dependent on river transportation. The settlements were dominated by floating and stilt houses with some parts of the building constructed on land and water, which were accessed using a wooden bridge. The cultural practices is a form of community response to the existence of rivers, which function as agricultural irrigation, shipping routes for the transportation of people and goods, as well as sources of drinking water, washing, and bathing. Therefore, settlement on riverbanks are an important element of cities that need to be integrated into development policies.

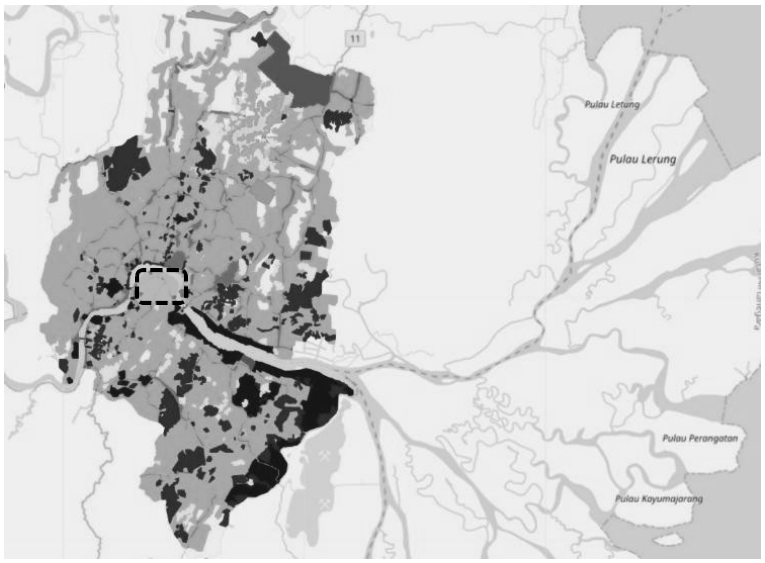

Figure 1. Study Location: City of Samarinda
Source: *Gistaru Samarinda, 2024*

The distance to public amenities, cheap housing price, and distance to the workplace are among factors that are important determinants of urban development (Mohd Amirul Mahmud., 2016). The development of these areas are inseparable from economic problems that require public policy planning to respond to existing dynamics. In addition, economic dynamics and development policies are interrelated following the developing social conditions. This dynamics also influenced economic policies in development planning, depicting city development priorities (Stern, 2004). The development plans are realized through city land use and identification of land needs (Odoom, 2016). This

research aimed to describe the urbanity of riverbank settlement in the city of Samarinda in respect to historical practices, while focusing on the relationship between development policy dynamics and the economy.

The community has a culture of living on the water whose existence is still maintained. These large rivers act as the main route for transportation in Kalimantan, thereby promoted the development of settlement along the riverbank. Additionally, in the pre-colonial era, the Samarinda city was a trade center driven by rivers as the major transportation route.

The settlement on the riverbank were originally built for traders as well as used for related transactions. Initially, these settlement had a low density and linear pattern, with each house having a boat mooring for mobility. The land, which was dominated by peat and soft soil layers always submerged in water, was rarely used as settlement areas. Furthermore, there were numerous floating buildings, because these structures supported the flexibility of community activities such as trade-in floating market and fishing on the river. Community social relations was supported by an agricultural-based economic pattern that inspired the formation of settlement (Geenen, 2013).

LITERATURE REVIEW

Management of settlement on riverbank is essential in terms of preservation, restoration, ecosystem conservation, pollution control, and transportation. Similarly, the management of certain regional areas, emotional and recreational values. The morphology of buildings on land differs entirely from those in rivers (Wicaksono, 2022). A preliminary research conducted in the city of Melaka, showed that the guidelines regarding size in the design of riverbank settlement were essential (Ghasemi, 2014).

Government policies also played a significant role in the development of settlement morphology (Zhu, 2019). For example, the Samarinda City Regional Spatial Plan (RTRW) 2023 to 2042 was implemented during the designation of the Samarinda Seberang region as a Social and Cultural Strategic Area. The policy determined how open and built spaces interacted with each other. Community adaptation to riverine environment is closely associated to the role of local government, thereby it is important to understand how the people adjusted to the surrounding (Mousazadeh, 2022). In several countries, the government strictly implemented Standard Operating Procedures for the regulation of riverine community. Furthermore, road construction promoted the development of road-oriented settlement. Community development that originally followed the river flow pattern merged with those oriented towards the road. Similar developments were also observed on the banks of the Kahayan River (Murti, 2020).

Several types of houses are found on riverbanks, namely raft, lanting, pole, and stilt. Raft houses generally inhabited by immigrants workers are

common on the Musi River (Sarwadi, 2001). This differs from the unique lanting houses dominating the city of Banjarmasin. The lanting house tend to float in accordance with the river water level (Setiadi, 2021). Meanwhile, the pole or stilt house model is found in every settlement on the riverbank, both in the cities of Samarinda and Banjarmasin. Open spaces between buildings is important in forming an ideal regional identity. Settlement on the riverbank were often associated with slums (Noor, 2023), therefore, there is need for adequate proportion of open spaces to correct this impression. The relationship between the building mass and open space can be determined using the figure and ground method. Generally, settlement on the riverbank follow a curvilinear pattern, or the curve of the river. In the context of urban open space, the development of a city with a river as the axis needs to consider circulation, access to the water body, city orientation, and the arrangement of surrounding buildings (Anilaputri, 2023). The settlement on the riverbank in the city of Samarinda determined the morphology of the area. It had long been formed and was perceived as the identity of the people. The pattern of urban space use shows the diversification of spatial functions in these areas. The identified problems were associated with settlement spatial planning, and the dynamics of developments, which tend to lead to regional evolution in the future.

RESEARCH METHODOLOGY

This qualitative research adopted a descriptive method with primary and secondary data collected through observation and literature review. The qualitative design comprised research objectives, data collection, and analysis (Leedy, 2019). Data collection methods focused on relevant information, means of collection, and unit of analysis. Meanwhile, primary data was obtained based on field observations, using the analytical descriptive method. The 3D modeling methods served as a means to visualize settlement forms.

ANALYSIS AND DISCUSSION

The development of Samarinda, which was originally a river-based city during the colonial era, was driven by road construction, although many of the community still reside along the riverbanks. Initially, the process was affected by various traditional factors because the community was dependant on the rivers, which acted as trade mobility routes due to limited roads. The colonial government moved the settlement areas from the riverbank to along the city canals. However, as the population increased, land transportation development promoted the orientation of settlement towards roads. This influenced the economic policy of the city, driven by the introduction of technology and capitalist economic system. In addition, large-scale trade experienced rapid growth and was prioritized. Natural product commodities were no longer

exploited for the needs of the local communities and those outside Kalimantan (Ahyat, 2012).

Urban areas were developed during the early era of independence, despite the unstable economic policies. Initially, the city of Samarinda failed to experience significant changes. The agricultural sector dominated the local economy, while rivers played a major role in transportation. Road construction intensified as population density and community mobility increased. Settlement by the roadside started getting denser, including non-residential activities, while those along the riverbank experienced changes, in the form of community adaptation. These community began to adopt two orientations, facing both river and road (Andini, 2011). Kalimantan is endowed with great natural resource potential, for instance, the cities of Samarinda and Banjarmasin indirectly receive economic benefits from mining activities. This led to the need for large-scale road construction to support mobility to ports and ease the burden on river transportation (Subiyakto, 2002) . However, massive road construction incitied the development of land-oriented settlement.

The road was built in accordance with the river flow, connecting the airport, city center and rural areas. The construction process increased community mobility, including traffic density. The increasing use of roads and motorized vehicles for human mobility and economic commodities gradually started to reduce the role of rivers as the main transportation route (Subiyakto, 2002). In addition, development driven by economic policies changed the city form, from a community developed along the riverbank to an increasingly broader area following the road network pattern. Roads developed into trade corridors and indirectly changed the professions of the people which was originally river-based. Majority of the people started changing professions, from agriculture to business and trade-related activities. However, due to changes in economic policy orientation, Samarinda city center experienced increased density. These changes promoted rapid expansion of settlement areas. The choice of land no longer considered proximity to the river. Additionally, almost all empty land was used for settlement purpose due to the growth in economic activity. Land closure also occurred along the riverbank, resulting in the use of existing mangrove and peat lands. As a result, many river mouths and water channels experienced narrowing and closure of water flow, including complete blockage by settlement projects, thereby leading to increased sedimentation (Andini, 2011).

The shift in livelihood orientation of the community from a river to land-based economic sector is slowly moving the settlement away from riverine life. Furthermore, the construction of new settlement areas alongside those on the riverbank oriented towards the road increased. This led to the decentralization system policy, implemented in 2001. The finance for development management were handed over to the City/Regency government. Meanwhile, income was raised by inviting investors for the continuation of city development. Policy

changes brought the city of Samarinda face to face with global economic forces or investors. This led to a stronger market-driven economy (Geenen, 2013), causing the urbanity-based development to experience pressure. The city economy, which was previously dominated by the role of rivers, was replaced by a development form based on financial gain and land speculation. This implied that river-based infrastructure development was slow.

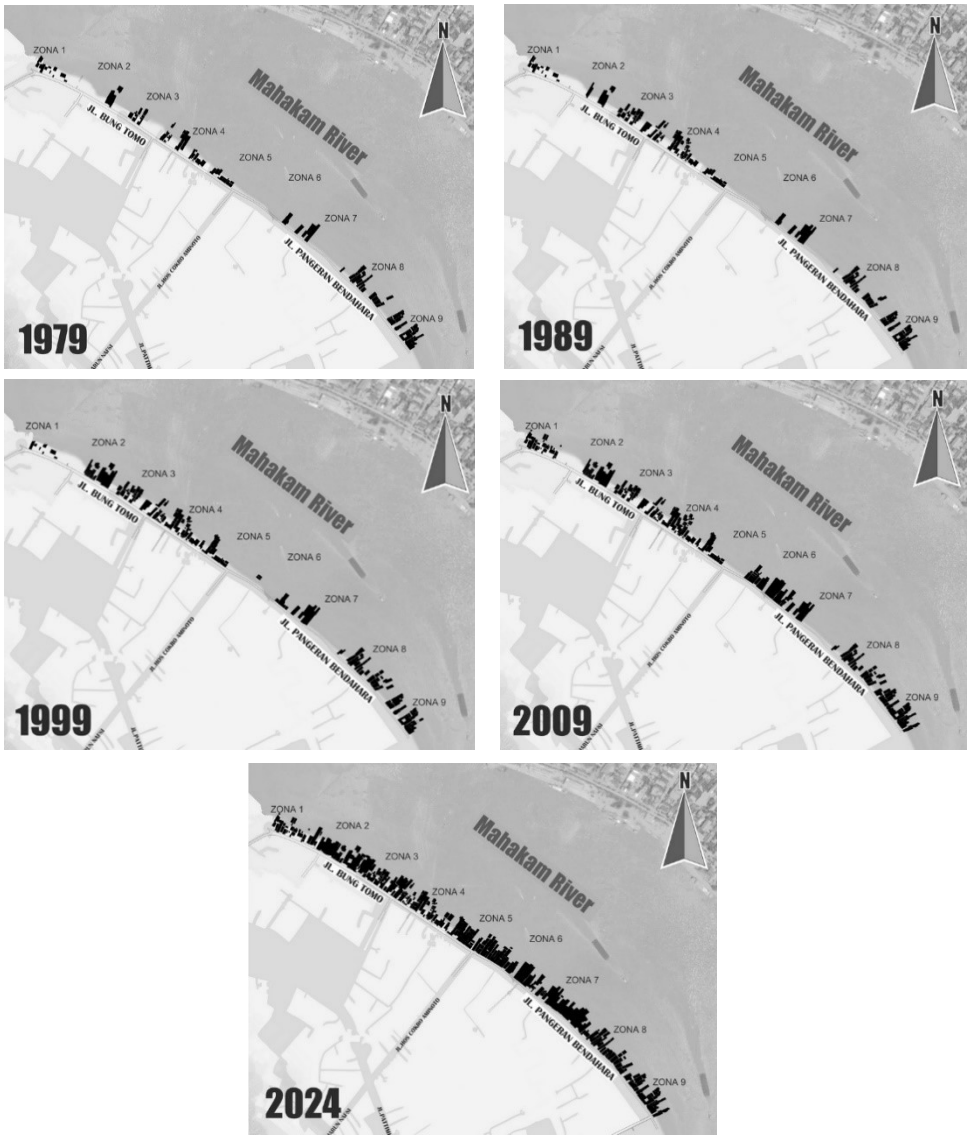

Figure 2. Development of Samarinda City Riverbank Settlement
Source: *Survey, 2024*

Figure 2 shows the development of the Kota Lama settlement on the banks of the Mahakam River in Samarinda Seberang which had been in existence for a long time. The increase in building mass was observed since 2009, while the water culture had also been maintained till this day, as proven by the existence of local boats moored in almost every house along the riverbank. The sporadic increase in buildings oriented towards the river body caused irregular circulation patterns as shown in Figure 3.

Figure 3. Settlement conditions on the banks of the Mahakam River in Samarinda
Source: *Survey, 2024*

Empirical data stated that the *Kota Lama* settlement in Baqa Village, Samarinda Seberang, showed significant morphological complexity. The number of building lots in the research area were 162, reflecting the density of settlement on the Mahakam Riverbanks. Meanwhile, one plot can accommodate two to 10 houses oriented towards the river body, showing the adaptation of the community who live on the water. This condition caused the building mass to increase, generating dynamic and varied patterns. The uniqueness also reflected the adaptation of the community to the heterogeneous river environment. The tendency of increased building masses annually, led to new challenges and opportunities in regional planning.

Table 1. Building Mass Pattern

Segment	Number of Lots	Total Building Mass	Comparison	Pattern
1	24	54	1 : 2.25	Heterogeneous
2	24	68	1 : 2.83	Heterogeneous
3	18	39	1 : 2.17	Heterogeneous
4	23	53	1 : 2.30	Heterogeneous
5	13	30	1 : 2.31	Heterogeneous
6	15	49	1 : 3.27	Heterogeneous

Segment	Number of Lots	Total Building Mass	Comparison	Pattern
7	17	34	1 : 2.00	Heterogeneous
8	13	28	1 : 2.15	Heterogeneous
9	15	27	1 : 1.80	Heterogeneous
Total	162	382	1 : 2.36	

Source: Studio, 2024

Table 1 shows that the settlement on the riverbank, is few as proven by the comparison of 1: 2.36. This explains that on average only two to three building units in a plot were oriented towards the river. However, Figure 4 showed that the irregular placement of the rectangular buildings was oriented towards the river body.

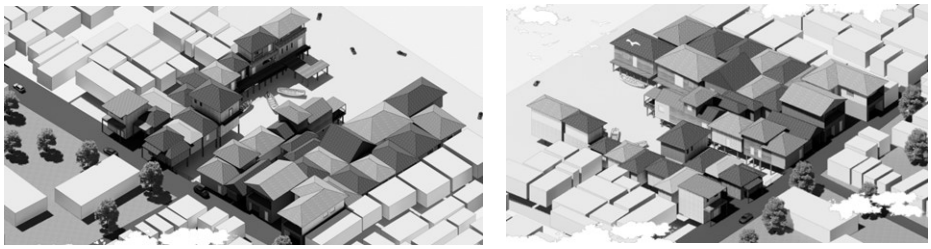

Figure 4. Settlement on the banks of the Mahakam River, Samarinda City
Source: *Survey, 2024*

The results of the survey showed that three types of building mass patterns were formed in response to the diversity of the building units, namely:

a. The mass of the building is square, depicting symmetrical balance in the arrangement of the units. Generally, the building functions as a simple house occupied by the head of the family.
b. The rectangular pattern of longer building masses, showed variations in design and space configuration. This pattern reflected community adaptation to geographical conditions and the dynamic river environment.
c. The length of the building mass was approximately 51.5 meters. Additionally, the model with a long mass was often observed along the riverbank in Samarinda. The pattern showed the existence of community adaptation to the use of space and functional needs in the context of settlement on water.

This pattern analysis provided a more detailed picture of the preferences and needs of the community in riverbank areas. In addition, the diversity produced a dynamic diagram of regional morphology, enriching the understanding of settlement complexity on the banks of the Mahakam River which tend to be dense.

Figure 5. Development of Riverbank Settlement in Samarinda City
Source: *Survey, 2024*

The elongated mass pattern reflected the community adaptation to the geographical conditions of the Mahakam riverbank, which tends to be sloping. This pattern showed the efficiency of land use along the riverbank, where one plot sequentially accommodated several housing units (figure 5).

Figure 6. Development of Riverbank Settlement in Samarinda City
Source: *Survey, 2024*

Houses in rectangular forms extending towards the river body show the flexibility of the community in adapting to the riverbank conditions (figure 6). This form of settlement characteristic produced a dynamic but orderly spatial arrangement. In each plot, the building masses formed rows, which piled up, thereby producing distinctive visual scene with efforts to use the land optimally. This condition reflected the combination of residential function and aesthetics resulting in unique characteristics of riverbank settlements. The dense settlement

with a mass of buildings stacked to the river body produces a narrow distance of approximately 1 meter between the houses. These dense spatial patterns were also visible in the transportation routes towards the river. The movement path in the form of a wooden bridge can only be used by motorbikes, producing a narrow corridor connecting the settlement and river body. This pattern reflected community efforts in terms of maintaining settlement density while providing limited access to the river.

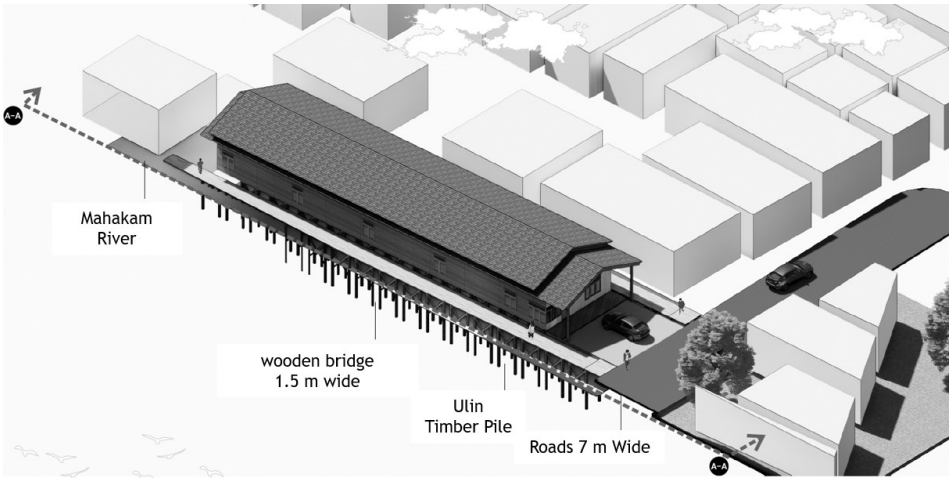

Figure 7. Longitudinal Model Settlement on the Riverbank of Samarinda City
Source: *Survey, 2024*

Empty spaces were found in ditches between the buildings, which led to opening between the building mass and the river body (figure 7). Overall, the spatial pattern formed produced a well-organized regional structure. Settlement density was balanced with measured access routes, maintaining an equilibrium between land efficiency and the need for interaction with the river. The existence of space above the river led to harmony in land use, including the unique character of riverbank settlement.

CONCLUSION

In conclusion, an urbanity review of the riverbank settlement in the city of Samarinda showed that development and economic policies greatly influenced the patterns. These were transformed from an area previously dominated by the role of rivers and riverine life, as well as agricultural activities towards future development patterns. Presently, the patterns were dominated by land-based infrastructure development and road-based economic activities. Despite the fact that the river physically divided the city, the role in the daily lives of community members was decreasing. As a result, the priority of riverine infrastructure

development and similar activites had also been reduced from the city planning agenda. Adequate attention was given to the river space in the past when policy activity-based urbanization and land-based economic development were insignificant. This was due to the agricultural economy which relied heavily on rivers as a water source and transportation route. Therefore, the cultural practice of residing in a riverine environment was deeply rooted in the community.

Rivers and water spaces were prioritized in Samarinda city planning during the colonial era before the expansion of urbanization and land-oriented development shifted the main role as community mobility routes. After the domination of economic policies driven by market-based development priorities, urbanization became more rapid and massive. Additionally, road-oriented development incited a decline in the closeness of the community and water spaces. The attention given to the river quickly reduced as proven by the increasing number of peatlands, and canals controlled for land development. The need for comprehensive long-term urban planning and development strategies were urgently adopted to prevent disasters originating from water problems in the future. This planning needed to prioritize the continued existence of water urbanism and the connection to a sustainable agricultural-based economy. The evaluation of a market-based economic and development policies, including land-based infrastructure was carried out to ensure the realization of patterns that focused on sustainable water spaces. It was further concluded that:

a. Settlement Density: Settlement density was extremely high, with each lot, although narrow accommodating a large number of building masses lined up, thereby producing a closely packed dense structure. This reflected the community adaptation to limited land on the riverbank, where efficient use of space was the main focus.
b. Formed Morphology: The morphology of the area was classified as heterogeneous with a variety of building mass formations. Based on empirical data, it appeared that the community chose a variety of building forms, ranging from squares, to rectangles. The creativity of this architectural form led to the architectural characteristics of the riverbank settlement.
c. Open Space: The spatial pattern formed showed that the existence of open space was limited. Each lot was completely filled by the mass of the building, leaving slight spaces in-between. This phenomenon resulted in a dense and uniform settlement atmosphere, with limited open space. Furthermore, the open space in the canals and ditches leading to the river served as an access point for sand miners.

This research contributed to understanding the development of settlement on the riverbank. The findings regarding heterogeneous morphology and limited open space were the basis for better spatial planning.

Focusing on efficient land use and diversity in architectural design was the basis for implementing sustainable development policies and maintaining unique characteristics, stated as follows:

a) Morphological Specificity: The morphology of the area showed uniqueness in house architectural design, reflected in the diverse forms, such as square mass with variations in dimensions.
b) High Settlement Density: This research reported that there was high settlement density. Each lot on the riverbank contained several buildings stacked together, resulting in a dense settlement structure, perceived as a response to the limited land on the riverbank.
c) Limited Open Space: The spatial pattern formed showed that there was limited open space. Even though there were some empty spaces, such as those where the ditch met the river, these were few.
d) Implications for City Planning: This research provided input for city spatial planning, specifically regarding settlement density, efficient land use, and paying attention to open space on the riverbank. In the future, settlement planning on riverbanks needs to consider specific morphology and dynamics of spatial patterns to produce a sustainable environment in line with community needs.

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