

Strategy to Adjust Musi Riverfront Development at Palembang

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Abstract: Redevelopment at Musi riverside in Palembang is needed in order to establish the identity of Palembang as a river city, as well as the opportunity of exploiting the potential of the riverside for developing various urban activities. This development is also needed in order to rehabilitate the decreasing natural hydrological function and ecological value of the waterfront as a result of unplanned physical growth in this low-lying area, one of the most rapid growing areas of the city. This paper aimed to present an appropriate strategy for urban development at the Musi river waterfront. Urban morphological approach is used in this study to understand the form and character of the built area in its geographical setting. The most appropriate engineering principle and scenario is introduced to support livability and sustainability of the lowland Musi river waterfront area through applying the appropriate technology needed, using different parameters such as environmental and engineering factors. The results revealed that the model with recognition of the ecological and engineering significance of lowland areas is important to achieve good quality development in generating the desired Musi river waterfront structural characteristics in the future, and at the same time can maintain the natural configuration of the environment.

Keywords: lowland environment; urban morphology; waterfront development

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1. INTRODUCTION

The city of Palembang in South Sumatra is located in low-lying banks of the Musi river, and the river banks area is the site of the early growth of the city. The existence of the Palembang Darussalam Sultanate center built in the early 17th century, the oil industry, port and various other municipal infrastructure, as well as community settlements demonstrate the use of the river banks in supporting urban activities.

Construction of a bridge across the Musi river in the early 1960s a big influence on the development of Palembang city, especially in the banks of the river Musi. Social and economic activities were originally oriented to the river began to shift to land, water and the vital role of regional banks of the Musi river as an artery of the city began to fade. On the other hand, the need for residential land is increasing due to urbanization and population growth has fueled the growth of community settlement fill vacant land on the banks of the river Musi, especially those located in the downtown area. Region riverbank wetlands character tends to be less organized, solid, and rundown, the impact on the preservation of wetlands that are naturally rich in benefits, both ecological, economic and socio-cultural.

Understanding the need to build the character of Palembang as a river city, as well as their chances of exploiting the potential of the riverbank area for developing various urban activities, riverside neighborhood began to receive attention. Efforts city authorities conducting arrangement, restoration and preservation of the river front need to be supported, given the economic activities relating to the urban banks of the river Musi such as industrial and commercial, as well as the unique cultural and historical heritage is left still has great potential to be developed.

Environmental management activities wetlands requires rules that do not conflict with the principles of ecology, therefore the development of the Musi riverfront which has the character of wetlands requires the principle of integration between the

activities of city development with conservation and utilization of wetlands.

Thus the existence of the research activities related to aspects to overcome the negative effects of physical development in the wetlands, in addition to the creation of the aesthetic value of the area, is required to create the design of city waterfront environment in Palembang.

2. EXPERIMENTAL DETAILS

A. Metodology

The study begins with delineating the observation area, followed by identifying the formation process and to evaluate the physical development of each region in relation to the ecological aspects of the surrounding, as well as the strategy to develop the region as a whole front.

Observation is held in low land inundated area along the banks of the Musi River that was developed for functional activities and community settlement. The building setting is observed in the field related to engineering used in overcoming due to overflowing tide, building's system, land use and land cover, drainage system; Data and information obtained based on the interpretation and evaluation were then analyzed with spatial analysis.

A study of the morphology of each typology is needed to explain the process of the waterfront formation as well as estimate the physical changes that will occur and their effects on the ecology of the area. The analysis will be done by testing the component patterns are two dimensional, include: analysis of the physical structure of the building layout, track movement patterns, landuse and space use, include a description of the form and physical structure on the site.

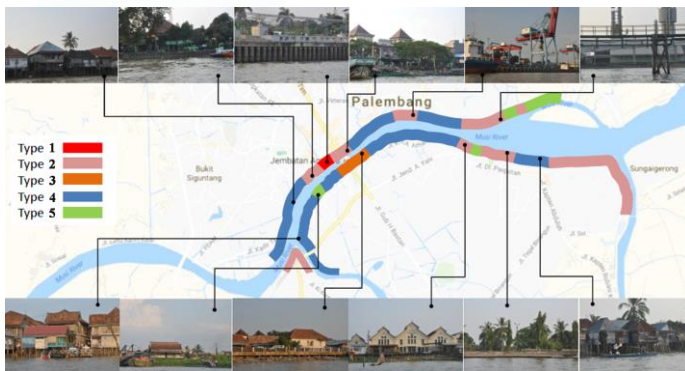


Fig.1. Water edge Typology at Musi Riverside, Palembang.

B. The principle of the development of wetlands inundated riverside

The performance of an urban river edge is a key aspect of urban redevelopment river. Compare performances between different sites, different alternatives, and different dimensions. There are three-dimensional approaches of Aesthetical Value of Watercourses: the river, the city, the people.

3. RESULTS

A. Types of water edges at the Musi riverside of Palembang.

Waterfront identifies the water's edge in cities and towns, and the nature of water edge identifies methodologies and techniques of further improvement. This is essential as it help to develop the area in reference to how people interact with that place. Therefore typologies of Musi river side in Palembang are essential part of this study.

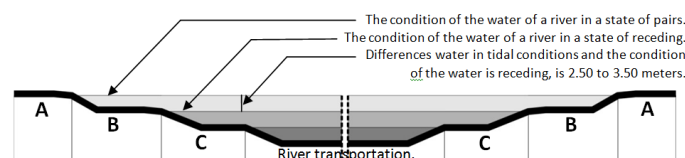


Fig.2. Cconfiguration Pieces of land on the banks of the Musi River in Palembang.

Based on observations of land use on the water's edge along the Musi River in Palembang can be distinguished by the uses of engineered barrier against tidal inundation of the river to support the urban facilities (port, factories, ware houses), the dwelling settlement, and also the greenfield.

The observation of some different locations along the Musi riverside in Palembang area (Fig.1) which are flood prone area found out that there are generally five dominant types of water edges, those are:

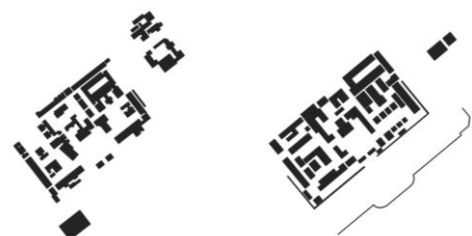
TYPES OF WATER EDGES AT THE MUSI RIVER PALEMBANG.	
	1. Lifted Plaza , creating a public space.
	2. Retaining wall , supporting functional buildings such as ports, industry, transport.
	3. Promenade , restricting the dwelling settlement and social facilities
	4. Lifted Dwelling Settlement
	5. Greenfield : shrubland area has not been built.

1.Morphology

The existing water edge's typology generally have experienced some changes in form. The morphology of riverside in flood prone has closed relationship with the potential inundation occurred and other hydrological characteristics. Changes in land cover and slope often impact on surface runoff, where the ability of the infrastructure will determine the quality of the environmental aspects.

From observations at shows the change in land use and the use of space in each typology are as follows:

A. Lifted Plaza



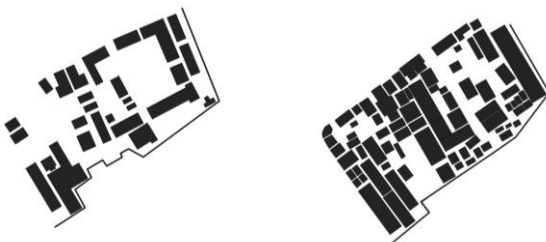
- The image of the area changed drastically when banks on the river section the site were heavily reinforced with high concrete walls.
- Development of an attractive plaza Provided social

space activities and uses connected with the Musi River have been developed in the areas.

- Changes in the function of the natural condition of the riverside system will affect: biodiversity, flood resistance, resilience of the riverside space systems and the functional use of the riverside.

2. Retaining Wall

- construction of a retaining wall and stockpiling was made before the building is mostly functional port, factory, warehouse, workshop, and other public facilities.
- the existing building site has infilled by new buildings surround the old one. land connection with water through a dock that had been prepared



- Numerous urban activities and uses connected with the Musi River have been developed in the areas. provided a continuously attractive social space.
- The river has been used as an important transport line, port, entertainment area, market place.
- Changes in the function of natural condition of the riverside system will affect: biodiversity, flood resistance, resilience of the riverside space systems and the functional use of the riverside.

3. Promenade

- In general, existing settlement areas have undergone a process of compaction in fills the spaces between the old buildings. 'The Promenade' circulation path parallel to the river was built later to limit new buildings that tend to develop toward the river.
- Supporting infrastructure, such as transportation and drainage system in the area is very limited.



- Loss of floodplain areas by the watershed development result in a river resource that significantly differs from the natural channel that once occupied its valley.

4. Lifted Dwelling Settlement

- In general, the existing settlement has undergone a process of

building's compaction filling spaces among old buildings.

- mostly in all sections, buildings were situated right next to the river body. In turn, these changes impose constraints on the application techniques to the riverside development.
- The occurrence of additional building toward the river as a result of infill in the settlement areas.
- The unplanned development of an urban watershed filling the flood plain near the river as well as changes in land use result in the soil disturbance and affect watershed hydrology.



- Activities in the watershed, including significant alterations in land use, and exposure of soils by building construction, can result in significant impacts to the riverside area. In turn, these changes impose constraints on the application techniques to the riverside development.

5. Greenfield



Undeveloped riverside area that overgrown by shrub and riparian vegetation. There is no clear boundary between land and water, especially during high tides. The area is not supported infrastructure, transportation, drainage.

4. DISCUSSION

The physical development objective of the riverside can be achieved through certain principles that will enhance the resilience of the riverside and reduce the environmental impact, these principles are: a) secure the quality of water and the environment, b) maintain urban space quality, c) develop accessibilities and activities.

A. Secure the Quality of Water and the Environment :

This principle is based on seeing the river as resources that can give the main characteristics of the area, and have significance to the environmental impacts and natural disturbance. Flood vulnerability related to the bank shape, and the presence of hydromorphological elements. Biological Components : Biodiversity, Presence of riparian vegetation in the river banks. Natural and Technological Hazards : Bank erosion and landslide risk.

The potential to secure the quality of water and the environment principle objectives for each types are Described below.

1. Lifted Plaza

- the vertical concrete walls reinforced the river banks give the resistance for floods Flood vulnerability Bank erosion and landslide risk.
- the low density in the area resulting in low disturbance of natural dynamic processes in the area
- Pavement causing changes in temperature, and other conditions that degrade habitat
- The ability of the infrastructure will determine the quality of the environmental aspects. The rainfall runoff from the urban area is diverted into the river.

2. Retaining Wall

- the degree of the disturbance of natural dynamic processes is high due to the high building density in the area.
- the banks are reinforced with vertical concrete walls menyebabkan the riparian vegetation in the area is completely absent.
- more infrastructure needed to upgrade the quality of the environmental aspects. The rainfall runoff from the urban area is diverted into the river.

3. Promenade

- The dense dwellings are situated right next to the river, bordered with promenade still allows the movement of the tide to the area
- The high density of the settlement led to high the disturbance of natural dynamic processes in the area
- the riparian vegetation is rare and almost entirely removed from the area.
- the rainfall runoff is drains directly into the river due to the lack of rainwater drainage system.

4. Lifted Dwelling Settlement

- The dense dwellings are situated right next to the river, the elevated construction of dwelling still allows the movement of the tide to the area
- The high density of the settlement led to high the disturbance of natural dynamic processes in the area
- the riparian vegetation is rare and almost entirely removed from the area.
- the rainfall runoff is drains directly into the river due to the lack of rainwater drainage system.

5. Greenfield

- The slope of the river edge is natural and allows movement of the tide flooded the area.
- The degree of disturbance of natural dynamic processes on the greenfield is low.
- The area was densely covered in riparian vegetation, and variety of species (aquatic, amphibian and terrestrial vegetation) is high.

B. Maintain Urban Space Quality

Visual Permeability (Visual contact Depth of views, Width of views), Density of landmarks, Built space quality, Public utility of riverfront, Intensity of construction. Significance to the visual, social, and cultural identity (city image, community identity), and Cultural Heritage :

1. Lifted Plaza

- the quality and amenity value of open space with proper public utility infrastructure strengths the characteristic of the

area which significance to the visual, social, and cultural identity of the city.

- there are some typical *belvederes* in the area and landscape points in the back ground.
- the cultural heritage with high quality is attractive (old sultanate palace).
- public utility infrastructure spread in th riverfront area.

2. Retaining Wall

- the quality of buildings (business and commercial) are characteristic of the area.
- buildings with poor quality, public utility infrastructure spread mostly on the river bank.
- In the area, a partially urbanized use of the riverfront area prevails with predominantly urbanized use of riverfront.

3. Promenade

- footpaths are arranged along the entire study reach on both sides of the river channel
- poor quality urban environment in the area with a dense circulation path network, poor quality of public utility spread mostly on the river bank.
- the cultural heritage of vernacular architecture settlement is extremely abundant and attractive and undoubtedly contributes to the aesthetic value of the area.

4. Lifted Dwelling Settlement

- Poor quality constructions are to be found in the settlement where several old dwellings require for reconstruction.
- The quality of the riverfront areas and amenity value of the riparian areas is very low due to the characteristically low settlement quality and recreational possibilities.
- the cultural heritage of vernacular architecture settlement is extremely abundant and attractive and undoubtedly contributes to the aesthetic value of the area.

5. Greenfield

- In general, the state of the green system within the study area is good.

C. Develop Access and Activities

Making riverside area as an active, livable, and accessible area. This principle allows for a functionally diversity of uses along the riverside will create attractiveness and vibrant waterfront, public spaces and cultural activities. It is also the accessibility of the riverfront by river crossings, public transport, walkways and bikeways.

The potential to increase access and activities for each types are described below.

1. Lifted Plaza

- The waterfront areas is accessible to the public and it has a diversity of urban activities.
- The attractiveness of the area is high due to numerous possibilities of spatial uses and activities along the plaza
- The pavement allow significance to the visual, social, and cultural identity (city image, community identity)
- Activities in the area can result in significant impacts to the riverside area.

2. Retaining Wall

- Main characteristics and strengths of the area is the diversity of urban activities with predominantly urbanized use of riverfront prevail in this area and give the ignificance to the visual, social, and cultural identity (city image, community identity)
- people navigation with boats of all sizes on the river.

3. Promenade

- The Path in front of the settlement area as an important element of the urban design runs parallel to the river bank and adds to the amenity value of the area
- The waterfront areas is accessible to the public. Easy approach to waterfront.
- Mostly circulation, neighborhood activities are possible. Water independency.

4. Lifted Dwelling Settlement

- The waterfront areas is not accessible to the public, difficult approach to waterfront.
- Mostly circulation, neighborhood activities are possible. Water independency.
- Traffic is limited and no parking; only has routes to the river.

5. Greenfield

- The green field areas is not accessible and the waterfront area is difficult to be approached. No circulation and no activities are possible.

5. Conclusion

In the area of the city centre, a diversity of urban activities were predominantly urbanized use of riverfront. The attractiveness of the area is high due to numerous possibilities of spatial uses and activities. The built-up area on each bank of the Musi River is characterised by urban visual axes. In the Musi River study area, a partially urbanized use of the riverfront area prevails. Therefore the amenity value of the riparian areas is highest on the central area due to the characteristically high commercial quality and recreational possibilities. The attractiveness of the riverfront area is high in the center, more densely urbanised area.

The strategy also aims at using plantation to achieve two goals, the first is using plantation as an air filter. The second is using it as space definer in which plantation will be use to visually define various spatial functions allocated along the riverside.

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