

Sustainable Waterfront Development Approach for Revitalization of Settlements in Heritage Area (Study Case: Kampung Arab Al-Munawar, Palembang)

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Abstract. The waterfront area of Palembang City is a cultural heritage and a strategic area where development is prioritized. The Musi River, as a transportation route and trading entrance, has resulted in the formation of ethnic migrant settlements on the banks of the river, one of which is ethnic Arabs. Kampung Arab Al-Munawar area is one of the oldest Arab villages located on the banks of the Musi river, with eight cultural heritage buildings. However, unfortunately, this Arab village is facing problems of residential density, informal buildings which cause slums, areas prone to flooding, lack of green open space, and inadequate facilities and infrastructure. Therefore, those problems have reduced the life quality of the residents as well as poor environment for living. This research aims to determine efforts to improve the quality of the physical and non-physical environment (social and economic) using a Sustainable Waterfront Development approach.

Keywords: *Heritage, Kampung Arab Al-Munawar, Revitalization, Sustainable Waterfront Development, Waterfront.*

1 Introduction

Palembang city is a strategic area that is a port city and one of the trade centers in the Sumatra region. The Musi River functions as a transportation route for native people to the shipping routes of immigrants such as Arabs, Persians and Chinese [1]. This phenomenon proves that many trading activities are carried out around docks or waters. The large number of activities in this city has caused many immigrants to settle and raise families with the local community, resulting in the formation of ethnic settlements, one of which is the Arab settlement [2].

Kampung Arab Al-Munawar is the oldest Arab settlement in Palembang City, located on the banks of the Musi River. In this village, there are eight cultural heritage buildings, therefore this area is included in the cultural heritage area and a strategic area where development is prioritized [3]. Furthermore, this area

is also included in spiritual and local wisdom protected areas [4]. However, behind these potentials, Kampung Arab Al Munawar still has several problems of its own based on the field survey.

One of the problems is clearly visible in here is the only area being revitalized in which the eight cultural heritage buildings in Kampung Arab Al-Munawar, not the regular residential villages around the area, causing the development gaps to appear. Therefore, it is necessary to strategically widen the development more thorough so the improvements of various physical and non-physical qualities in the area can be realized. Kampung Arab Al-Munawar area is in Seberang Ulu Dua District [5]. The annual growth rate for 2010-2020 is 0.83%, while the population density per km^2 is 9,376 (6.01%), and the RT¹s in this area is 22,962 (4.46%). Based on ATRBPN² data, 34% of the land in the design area has legal status, while 66% of the land does not yet have legal status, which causes the problem where the amount of informal buildings keep increasing. Consequently, the area will become illegal and slum over time.

This area is also potentially prone to flooding because it is located on the banks of Musi River and there are still many tributaries that are still active. Due to the potential for flooding, this area also needs improvement to the sanitation system and rubbish under the residential house so that public health can be guaranteed. Flooding is also caused by a lack of green open space in an area which only has a percentage of 5% of the total area, even though based on [6], green open space in an area must cover a minimum area of 30% consisting of 20% public green open space and 10% private green open space, so that the area only has a few open spaces as a place for socializing and community-activities as well as helping to absorb or store rainwater in the ground.

Based on several of problems mentioned previously, the idea arose to design a program for settlement revitalization of Kampung Arab Al-Munawar area to improve the quality of the physical and non-physical environment in the area. Environmental planning used a Sustainable Waterfront Development approach, which also considers cultural heritage areas. This ensures the revitalization creates quality urban spaces that are well-designed, well-managed, and contribute to social, economic, and environmental improvements.

¹ Rukun Tetangga (RT): a community-level administrative unit in Indonesia

² Aset Rumah Tangga Badan Pertanahan Nasional (ATRBPNN): a government agency responsible for managing land affairs, spatial planning, and the regulation of land use in the country.

2 Study Area

This residential area is located in Seberang Ulu II district, 12-13 Ulu sub-district. The area has an area of 16.6 hectares, consisting of 76% residential, 7% trade and services, 2% public facilities, 5% green open space, and 10% road network. The design area in the North borders directly on Musi River, and in the West, it borders directly on the Musi tributary, while in the East side, it borders on Jl. Jembatan Musi IV, which is the link between Seberang Ulu and Seberang Ilir in Palembang City, and in the South borders residential areas.



Figure 1 Location of Study Area and Sites

Kampung Arab Al-Munawar Arab is located on Jl. KH. Azhari, especially Lrg. Almunawar which included in the cultural heritage area. The following image is the distribution of eight cultural heritage buildings in the research area.

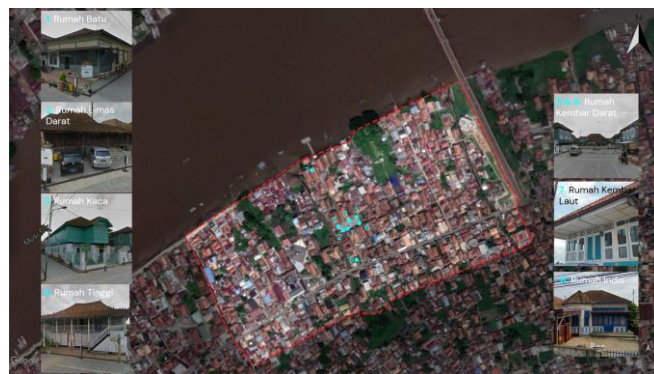


Figure 2 The Distribution of Eight Cultural Heritage Building

3 Methodology

The method used in this research is the synoptic method. Synoptic method prioritizes structured steps in solving problems, by prioritizing a combination of several alternatives so that a conclusion is reached from the best aspects of each alternative proposed [7]. Data collection and observation of existing conditions (primary and secondary data) are used in this method, together with literature review, identification of potential problems and their development, formulation of objectives, producing design concepts, developing concepts in the area by applying the Sustainable Waterfront concept, and Design Simulation. The analytical method used is qualitative descriptive analysis.

4 Discussion

4.1 Urban Revitalization

The increasing population growth or urbanization of the Arab ethnic population on the banks of the Musi River influences the density growth factor in the area. This causes informal buildings to continue to increase and cause the area to become increasingly denser and slum overtime. This can be restored by carrying out Urban Revitalization, which is an approach to improving the urban environment which aims to increase the income of residents living in slum areas by providing job opportunities, entrepreneurship and skills training programs for the community to make them more economically productive [8].

Urban revitalization program can be used to improve the area and make it more functional than the previous situation. Urban revitalization also concerned with the physical, economic, social, environmental, cultural and historical of the urban area [9]. The revitalization of urban waterfronts, as well as the qualitative upgrading of their spatial condition values, are given special attention, particularly if large urban transformations occur and alter the urban heritage. The development of waterfront areas is critical in this regard, as it allows for the proper integration of human hobbies and settlements in a deteriorating and constantly vulnerable area [10].

4.2 Concept of Sustainable Waterfront Development Approach

Sustainable Waterfront Development is an approach that consists of sustainable design (sustainable development), flood control (mitigation and adaptation), and river-oriented development (has two faces) [11]. As a part of sustainable development concept, this approach is expected to improve the condition of settlements in areas that are classified as slums without destroying the surrounding conservation buildings, also improve the condition of the waterfront

in areas that have the potential to become dock areas and function as recreation areas and the habitat preservation of the area.

Meanwhile, for water control (flood control), the selected area is on the banks of the Musi River, while its typology tends to be swampy, so it has the potential for flooding if rainfall is high and river discharge increases. Apart from that, development that faces the river is very important to make the river the focal point of the area so that the sustainability of the river can be maintained.

4.2.1 Standards for Waterfront Development in Urban Areas

There are several principles for waterfront development in cities that can produce quality and prosperous urban space for the community [12]:

Table 1 Principles Waterfront Development and Meaning

No	Principles Waterfront Development	
1	Land Use	Utilizing various functions in an area, adding tourism and commercial functions to the seaside area.
2	Urban Identity	Paying attention to nature and culture, the waterfront is considered a catalyst for identity preservation and an important opportunity to represent the city's distinctive identity.
3	Socio-Economic Benefits	The waterfront area is considered an urban advantage that can improve the economy and attract a lot of investment to the area and surrounding areas, taking into account long-term value and excellence.
4	Urban Depth Development	It is necessary to link the relationship between the city and the waterfront, so that if the project is successful the waterfront can accommodate many activities and can increase the value of the area.
5	Accessibility	It is necessary to prepare for the accessibility of the beachfront area from all corners of the city with networks and various facilities such as public transport, pedestrians and bicycles as well as private vehicles.
6	Place Making Quality	Providing a mixed function that includes housing, supporting facilities and services, and recreational and entertainment activities. The image of the region and the city can improve if the waterfront project is successful.
7	Environment-tal Quality	Creating areas that pay attention to ecology and sustainable waterfront development, such as: Using green infrastructure, both on river banks and along green belts, Providing pedestrian-friendly paths and attractive, shady open spaces, Using sustainable waste collection management, Reducing energy and material consumption, Using sustainable water management.

4.2.2 Site Analysis of the Correlation between Principles Waterfront Development

Principles for waterfront development in urban areas are linked to the problems and potential found in the area, so that these findings can be summarized and used as a solution for structuring the area using a sustainable waterfront development concept approach, along with the explanation.

Table 2 Site Analysis of the Correlation between Principles Waterfront Development

4.2.2 Site Analysis of the Correlation between Principles Waterfront Development			
No	Standard	Problem	Potential
1	Land Use	-Land Use Distribution is dominated by residential areas	-Land allocation according to [3] and [4]
		-Lack of commercial activities	-Can be a generator driving the regional economy
		-Lack of green open space. Utilization of various functions in an area, additional tourism and commercial functions in the waterfront area.	-Maintain the ecology of the area
			-Still has the potential for good public facilities and new activity functions
2	Urban Identity	-The existing area tends to be dirty / slum area	-Located on the banks of the Musi river
			-In the selected area there are several cultural heritage buildings
3	Socio-Economic Benefits	-There are street vendors (PKL)	-Improve the economy of the surrounding community
		-The lack of community forums for gathering	-Bringing the area to life with new activities
4	Urban Depth Development	-There are no new projects underway yet	-There are cultural heritage buildings and buildings that have the potential to become cultural heritage
5	Accessibility	-Congestion due to careless parking	-Easy road and water access
		-The dock area is not well organized	-High vehicle mobility
		-Pedestrian paths that are not yet serviced	-Pedestrian paths can be continuous and connected
			There is a riverwalk area
6	Place Making Quality	-There are no buildings with mixed functions yet	-Become a place for people to gather, and become an economic generator in the area
7	Environmental Quality	-Areas with potential for flooding	-Implementing green infrastructure, wetlands on river banks
		-Lots of rubbish under people's houses	-Residential areas already use PAM water
		-Places for disposal are still minimal	-Residents can easily get water (implementing sustainable water management)

4.3 Site Development Concept

Based on the explanation of Sustainable Waterfront Development concept and the relationship between site analysis and this theory, a concept for site development is obtained which carries the vision of realizing settlement of Kampung Arab Al-Munawar as a sustainable waterfront and residential area has a regional identity, and can improve the economy of the surrounding community and city. The principles used draw conclusions from standards that have the greatest potential, where three main principles are obtained, which can be seen in the following table:

Table 3 Selected Principles for Concept Development

No	Principles	Tujuan
1	Sustainability -Adaptive & Mitigation -Accessibility & Connectivity	Become an environmentally friendly and sustainable area and can reduce the potential for flooding in the area.
2	Identity -Cultural & Society Engagement -Architecture & Riverfront	Becoming a settlement area that can support urban tourism, especially with its historical links to Kampung Arab Al-Munawar in Palembang which is on the banks of the Musi River.
3	Economic Growth -Recreational -Creative & Inovative	Become an area that functions as a generator of the community's local economy.

4.3.1 Design Alternatives

The use of the synoptic method produces several design alternatives. There is one selected area design concept with three capacity alternatives, measured in population regards, in high, medium and low capacity areas. The concept applied is related to the regional strategical goals, namely a combination of the concepts of sustainability, identity and economic growth.

The sustainable concept implements pedestrian, riverwalk and bicycle paths in a sustainable manner to facilitate access for the public and visitors, utilizes appropriate vegetation on riverbanks in wetland areas, and makes green open space a node in the area. The identity concept continues to apply stilt building architecture and local styles to site buildings, especially residential functions, and the concept of economic growth by building commercial areas (small stalls) along the river banks and building new functions (mixed use) in blocks that have informal buildings, as much as possible so that it can increase the income of the surrounding community with this new function.



Figure 3 Landuse Concept

High Population Alternative			Medium Population Alternative			Low Population Alternative		
No	Information	Total (people)	No	Information	Total (people)	No	Information	Total (people)
1	Max Capacity	5.892	1	Max Capacity	5.892	1	Max Capacity	5.892
2	Existing	3.310	2	Existing	3.310	2	Existing	3.310
3	Settled (Stay)	5.005	3	Settled (Stay)	4.120	3	Settled (Stay)	3.600
4	Temporary (Stay)	22.476	4	Temporary (Stay)	18.052	4	Temporary (Stay)	16.423

Figure 4 High, Medium, Low Population (Alternatives Design)

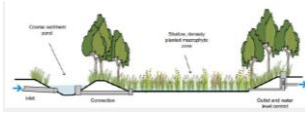
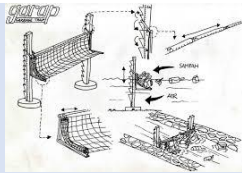
4.3.2 General Concept of Design

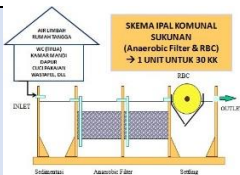
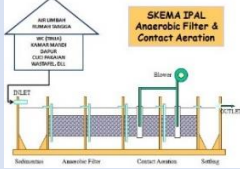
The overall concept that will be applied to site design is the Sustainable Waterfront Development concept which will focus on local waterfront development and environmental planning which emphasizes waterfront design and human relations with the environment in the area.

In detail, this concept uses a sustainable development approach, flood mitigation and river-oriented development. Sustainable development (sustainable design) is expected to improve residential conditions in areas that are classified as densed and contain illegal buildings that cause areas to become slums. The arrangement was carried out without damaging existing buildings in the area that some are cultural heritage buildings. Sustainable development also focuses on developing regional accessibility, as well as paying attention to the use of environmentally friendly materials, on pedestrian and river paths that use permeable pavement materials to absorb and filter rainwater.

The design area is on the banks of the Musi River, where the area is in a swamp so it has the potential to be flooded if rainfall is high and the flow of the tributary rises to the land. Therefore, the concept used is the application of wetlands on the banks of the Musi River to mitigate potential flooding. In addition to that, the development facing the river here in order to make the river focal point of the area so that the sustainability of the river can be maintained.

Table 4 Concept Implementation

No	Problem and Potential	Concept Implementation	Figure
1	Informal Land and Building also Dense Settlements	Implements: 1. Settlement Arrangement (Landed) 2. Vertical House 3. Addition of new functions (mixed use)	 Source: Observation, 2023  Source: Archdaily, 2023
2		Adding Green Open Space and Public Space, Water Catchment, Rainwater Infiltration Apply: 1. Permeable Pavement 2. Green Roof/Green Wall 3. Wetland (Musi river bank: Mangrove, Musi tributary bank: Akar Wangi/Vetiver)	 Source: Putraalamsari.com, 2023  Source: Sciencedirect.com, 2023  Source: Sciencedirect.com, 2023  Source: dlh.bulelengkab.go.id, 2023  Source: Abanuc.com, 2023
3	Sanitation and Waste	Implements: 1. IPAL system 2. Net System 3. Waste Disposal Point	 Source: Neliti.com, 2023

No	Problem and Potential	Concept Implementation	Figure
4	Flood Prone Area	There is a reservoir for runoff water Apply: 1. Retention pond or water square 2. Rainwater Harvesting	 Source: Masterplandesia.com, 2023  Source: Masterplandesia.com, 2023  Source: PUPR³, 2012
5	The area has cultural heritage buildings and buildings that have the potential to become cultural heritage	Implements: 1. Maintain the function and character of cultural heritage buildings 2. Applying the concept of adaptive reuse for buildings that have the potential to become cultural heritage, there is the possibility of changing functions and implementing new functions that are appropriate for the area.	

4.4 Design Simulation

4.4.1 Landuse

Activities in this area are dominated by densely populated residential areas. The area needs to be other functions that can support the regional vision, namely trade and services as well as tourism, which can drive the economy in the region. The

³ Pekerjaan Umum dan Rumah Rakyat (PUPR): a government ministry responsible for planning, developing, and managing infrastructure and housing projects across the country.

lack of green open space in the area is an additional function that needs to be included in land use planning. Green open space can be functioned as a place for people to gather and socialize and improve the quality of the living environment in the area. The design alternative chosen is an alternative with a high population capacity. This area is divided into two zones, a public zone and a private zone. Block 1A is a public zone and Blocks 1B, 2A and 2B are private zones.



Figure 5 MasterPlan Proposal

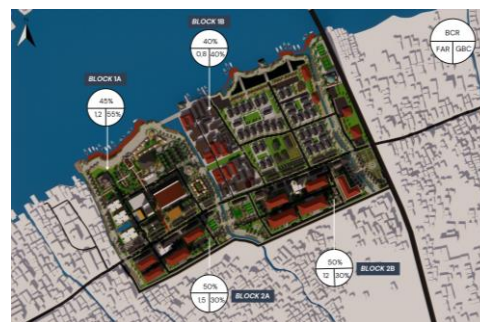


Figure 6 Building Mass and Intensity

4.4.2 Pedestrian and Bicycle Path

The addition of pedestrian paths to the road collector on both sides is continuous and can access local roads, the pedestrian path has a planter box as a separator between the pedestrian path and the vehicle path, the planter box functions as green infrastructure that maximizes rainwater infiltration in the area. The riverwalk area is a motorized vehicle-free area and specifically for pedestrians and cyclists, with the aim of maximizing more sustainable tourism that can access all areas. The riverwalk design is intended to be pedestrian-friendly by providing seating areas every 40 meters. The riverwalk area is a connector or link between blocks in the Kampung Arab Al-Munawar Arab residential area.

The material used for pedestrian is permeable pavement in such as grass blocks, so that water absorption can be maximized and reduces rainwater runoff. Pedestrians also strive to be inclusive by providing guiding blocks so that they are friendly for people with disabilities. There is a Bird - Eye Bridge (skywalk), which functions as a pedestrian path that supports visitors to get a tourist experience by maximizing the view towards the river. The Bird's Eye Bridge can become a new landmark in the area and can be a marker for visitors' access to the waterway.



Figure 7 Pedestrian

4.4.3 Open Space

Open space has a design that is easily accessible, universal, and can accommodate socialization activities for the community and visitors to the area. Using vegetation on the banks of the Musi River (mangroves) and tributaries (akar wangi/vetiver) it also helps to maintain the ecology of the watershed and can reduce the potential for flooding and improve the quality of the environment.



Figure 8 Open Space Public, and implementation of Mangrove and Akar Wangi

4.4.4 Activity Support

This area has tourism potential, so several new functions have emerged, such as night markets, mixed-use development (shopping centers and rental offices), hotels, apartments and commercial public spaces. The existence of those new functions is to increase the activities of local residents and to become a generator of economic development in new areas.



Figure 9 Commercial Mixed Use etc

4.4.5 Preservation

The surrounding buildings have adapted many of their materials and architectural styles. The need of upgrading the buildings that have the potential to become cultural heritage also need to be developed, by implementing adaptive reuse concept. Adaptive reuse is the practice of converting existing buildings or spaces for new purposes, different from their original design, without major demolition or new construction. This approach promotes sustainability in urban development and architecture by conserving the embedded energy of structures, minimizing waste, and preserving cultural or historical value. An example of the application of the adaptive reuse concept to historic buildings has been implemented in the Old Town area of Semarang [13].

4.4.6 Utilities

Kampung Arab Al-Munawar settlement has experienced a decline in both physical and non-physical quality, one of which is the utilities. This settlement on the banks of the river uses stilt house architecture. Unfortunately, a lot of rubbish was found under residential houses, and this could cause flooding in the area. At the same time, six net use points are implemented at the beginning and end of each tributary route in the area. At the same time, six mesh netting points have been placed to collect waste, coming from the Musi River as well as residents' homes, which are installed at each entry and exit point of the tributaries passing through the existing area.



Figure 10 Implementing Net on site

4.4.7 Adaptation and Mitigation

The application of stilt house architecture with different levels of pedestrian height and building pavement as high as 50 cm is applied to landed buildings. There are seven direct community access points to the Musi River to respond to the habits of local people who live dependent on the river. Mitigation can be carried out to minimize the potential for flooding. It can be implemented by the construction of retention and detention ponds in green open space areas of landed settlements, as well as implementing wetlands on the banks of the Musi River using mangroves and vetivers (Akar Wangi).



Figure 11 Retention Pond, Scenario without flood, and scenario with flood

5 Conclusion

In conclusion, Kampung Arab Al-Munawar has the potential to be developed into a cultural heritage-based tourism area as well as developing trade and service functions to become an economic generator in the area. However, to fully realize this potential, it is crucial to address the existing challenges, such as residential density, informal settlements, flooding risks, inadequate green spaces, and insufficient public facilities.

Implementing a sustainable waterfront development approach can transform the area by preserving the cultural heritage while improving the overall living conditions. This involves integrating sustainable design practices that enhance accessibility, environmental quality, and community well-being. Key strategies include improving sanitation, adding green open spaces, using environmentally friendly materials, and introducing flood mitigation measures like wetlands and mangroves, also the application of stilt house architecture.

Furthermore, the adaptive reuse of cultural heritage buildings will help preserve the area's historical identity while adapting them to new, appropriate functions. Ensuring proper development along the riverbanks, with a focus on maintaining the river's role as a focal point, will also contribute to the sustainability of both the community and the river itself.

By addressing these physical, social, and economic challenges through sustainable development, Kampung Arab Al-Munawar can become a thriving and resilient area that preserves its cultural heritage while improving the quality of life for its residents.

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