

DESIGN CRITERIA FOR OPEN SPACE AT THE RIVERBANK AREA IN KAMPUNG WONOREJO TIMUR

Endang Titi Sunarti DARJOSANJOTO¹;

Professor in Urban and Architectural Morphology
Department of Architecture, Institut Teknologi Sepuluh Nopember,
Kampus ITS Keputih, Sukolilo, Surabaya 60111, Indonesia
Email: endar@arch.its.ac.id
Tel: +62-817376937

Setyo NUGROHO

Graduate Students of Urban Design Studies
Department of Architecture, Institut Teknologi Sepuluh Nopember, Indonesia
Email: nuguroho@yahoo.com

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¹ Corresponding Author

Abstract – Kampung Wonorejo Timur as a settlement at the riverbank area is located in eastern Surabaya and close to Mangrove Conservation area. Currently, kampung Wonorejo Timur is facing two environmental issues. First, there is no planning at the riverbank area so that the floods could come up to the dweller's house. Second, the vanishing of privat place as affected by lots of motorized vehicles which are passing by. The paper discusses design criteria of open space at the riverbank area to solve those environmental issues by applying character appraisal technique and SWOT analysis. Design criteria are divided into two aspects: physical and non-physical which are based on general criteria and result of analysis. Result of design criteria shows that all buildings should face to both side (the river and the street), and the transition space at the riverbank and street must accommodate inhabitant's activity.

Keywords: Design criteria of open space, riverbank, Wonorejo Timur

1. INTRODUCTION

1.1. Background of Research

Rapid City development has changed urban façade especially at the riverbank area. History noted that people had chosen to live near the riverbank in order to fulfil their daily needs in water supply, transportation, and working. As described by **Norberg-Schulz (1996)**, the riverbank area plays important role as urban infrastructure and also a meeting place among people. Riverbank study always becomes an interesting topic of research since there is a rich phenomenon from the physical and non-physical aspect (related to social-culture). Lots of people utilize riverbank as social space. This space manifests in a transition space which means space between building and the river. In the City of Surabaya, riverbank settlements are able to be easily observed along the main river of Kalimas and its branches (the branch of Kalimas is Jagir and Surabaya River). Riverbank settlement located in the downtown and suburb area posses similarities in creating transition space as community place to nurture the social network among people (**Putra, Nugroho, Darjosanjoto; 2014**).

Riverbank in suburb area is facing problems related to the river maintenance, flood preventing, and unorganized transition space along the river. One of riverbank settlement case study in suburb area is Kampung Wonorejo Timur. The Kampong which is located at the riverbank of Jagir River has existed before 1940s. According to the local inhabitants, buildings had been built along the river and there was only a footpath inside Kampong as main access. Currently, residential development in eastern part of Surabaya City gives a physically impact to Kampung Wonorejo Timur. The Low flow of traffic with footpath now has changed into the high flow of traffic with asphalt material streets. Street inside the Kampong is getting more crowded than before due to the high flow of traffic. The number of motorized vehicle passing inside Kampong also caused the loss of public space for local people.

Moreover there is no building that oriented to the river. Riverbank is now only used as part of the land behind each house that can not be accessed from outside or mainstreet. Some houses still occupy the riverbank for cooking area, washing and laundry, and storing household items. Some others do not utilize the riverbank as a part of daily life activity. They constructed a solid and massive wall without access to the riverbank in order to avoid the flow of water from high tide. Besides the above phenomenon, the issue of decreasing public space is the most significant for Kampung Wonorejo Timur.

1.2. Purpose of Research

The problems of Kampung Wonorejo Timur focus on open space at the riverbank area including streets as public space for community. From the problems mentioned above, there are two purposes of research to achieve research's goal. The first purpose is to identify the problems as weakness and strength as potency. The second is to conclude the strategy and design criteria based on literature review and analysis. In order to obtain appropriate design criteria, analysis method related to the issues should be addressed.

1.3. Location of Research

The scope of research area is described step by step from the map of Surabaya to the area of study as described on Figure 1. The area of study is a part of administrative unit at the next-to-lowest level in the City (called *RW* in native language). The north side of the location is Jagir River, while the east, west and south

are surrounded by other Kampongs. Figure 1 show that the riverbank located in north side and a street from east to west dividing location into two blocks: north and south.

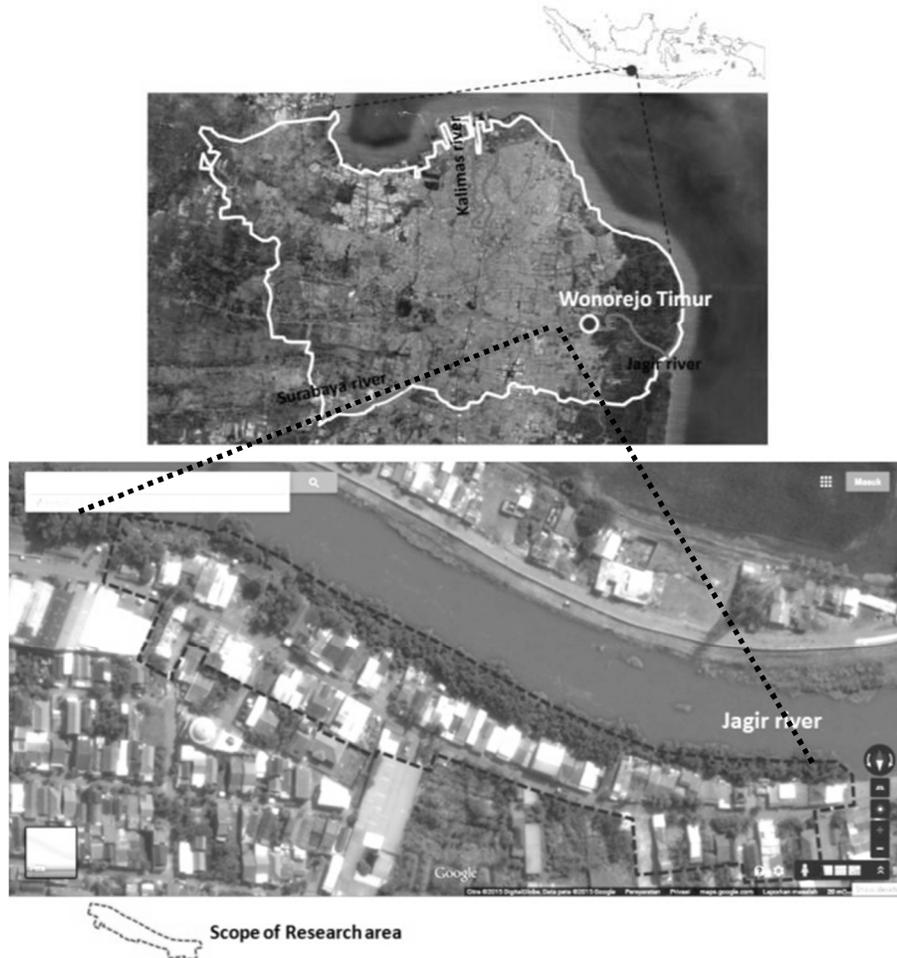


Figure 1 Kampung Wonorejo Timur as area of study

General overview of Kampung Wonorejo Timur can be seen on Figure 2. The left (a) and middle sides (b) of figure describe the atmosphere of Kampong with its main street and buildings. The width of street is approximately 4 (four) meters with asphalt surface material, 1 (one) meter both side as transition space between main street and main building with sand and aggregate surface material. The landuse of Kampong are varying from housing to home-based enterprise. Figure 2 (c) shows the existing condition of riverbank with embankment made of sandbags to prevent flood and high water level.



(a) (b) (c)

Figure 2 General overview of open space at the riverbank and Main Street of Kampung Wonorejo Timur (Field survey, 2015)

2. THEORITICAL REVIEW

Theoretical review includes two aspects: physical and non-physical aspect. The first stage is to obtain an understanding of physical and non-physical aspects related to the riverbank area. Non-physical aspect describes the relation between people as individual with an environment. Physical aspect concerns to the development of open space at the riverbank. After obtaining theories, synthesis of theoretical review based on the aspects above would be applied to summarize general criteria of open space at the riverbank area of Kampung Wonorejo Timur. As mentioned by Budihardjo (1999), riverbank area can be utilized as public open space which has several functions. In the scope of study, the functions of riverbank are to create public space and to prevent flooding.

2.1. Place Attachment

Socio-culturally, place attachment is described into 6 (six) processes: bonding based on kinship or genetic relationship; bonding arising from the equation; bonding as affected by economic value; cosmological bonding; bonding arising from religious beliefs or cultural event festival; and bonding based on story including history and giving the name to a place (Altman, Low; 1992). In the scope of riverbank research study, the six processes explained above will focus on the processes that are relevant to the Kampung Wonorejo Timur. It is a process that involves ownership and inheritance, including cultural aspect and social relations related to the condition of the riverbank.

Place attachment is a complex phenomenon involving various aspects that are bonding between people and place. As an example in the location of study, dwelling as a place for daily activities and then it creates a psychological bonding not only between human and their housings but also between human and their environment. Fundamentally, the environment was built by individual psychological process based on perception, cognitive-mapping, and spatial behavior (Lang, 1987).

2.2. Green Open Space Design

In the scope of riverbank, the analysis will be limited to three elements. First element is landuse as site design component. It is highly related to the urban infrastructure and supported facilities as Recreation Park which should fulfil the technical criteria. Second element is the system of circulation and connectivity including street networks, pedestrian and motorized vehicle circulation, and parking lot. The system of circulation plays role in integrating research area to surrounding potential areas. The last element is open space and greeneries which are ecologically, recreatively, and aesthetically significant for the urban environment.

2.3. Ecological Riverfront Design

Riverbank rehabilitation refers to an attempt to recovering river and its system in natural way in order to get a contribution of urban health and activity support (Otto, McCormick, Leccese; 2004). Riverbank rehabilitation should engage public facility such as Park, streets, culture event, and commercial buildings that attract urban investment and improve the quality of life of local inhabitants. The planning and design of riverbank rehabilitation should consider some points including flooding prevention, public recreation, and strategies which are able to enhance the ecological riverfront design. According to Otto, McCormick, Leccese (2004), the principles of ecological riverfront design include several criteria. A first criterion is to protect the natural feature of river and its function. The second is to apply non-structural for new construction. Following the third criterion is to reduce hardscape element around the riverbank area. Fourth is concerning to stormwater management, and the last criterion is to balance between public access and recreation with river conservation.

General criteria based on theoretical review are listed on Table 1. Design criteria of Kampung Wonorejo Timur should refer to these criteria.

Table 1 General criteria for riverbank design

Aspect	General Criteria based on theoretical review
Place Attachment	Open space roled as a product of dwelling process influenced by natural geography, culture, and social relation.
Green Open Space Design	Green open space must be created as urban design component.
Ecological Riverfront Design	The natural feature of river and its function should be protected, new construction may use non-structural alternative, hardscape element should be reduced, stormwater must be maintained, and It should be balancing between public access /recreation and river conservation.

3. METHODOLOGY

The research is descriptive qualitative based on urban phenomenon and field survey. Before conducting field survey, the research was begun with statistic analysis related to the data of social culture of local inhabitants and potential aspects of Kampung Wonorejo Timur. After obtaining those data, field survey is addressed in order to observe the physical aspect, potency, and opportunity of Kampong. The data are also collected from semi-structured interview with local inhabitants to get information such as: how long they live at the riverbank, the facilities they use around the riverbank in daily activities, the role of riverbank for them, and their hope of riverbank in the near future. The research used purposive sampling by taking respondents who live at the riverbank as the criterion. There are 10 (ten) respondents who are able to represent the location of research.

Character appraisal analysis tool is applied to overview, identify, and evaluate the existing condition of open space at the riverbank area (Ministry for the Environment, 2006). This tool is also applied for assessing and summarizing the characteristic of Kampung Wonorejo Timur. The result of characteristic from character appraisal analysis will be a data for the further analysis tool, SWOT analysis as mentioned on Table 2.

Table 2 Research goals and analysis method

Research Goals	Analysis Method
<i>First</i> , obtaining physical and non-physical information gathered from observation;	<i>First</i> , Character Appraisal and Analysis Tool;
<i>Second</i> , obtaining strength and opportunity of Kampong to compile a development strategy	<i>Second</i> , SWOT Analysis

4. RESULT OF DEVELOPMENT STRATEGY AND DESIGN CRITERIA

4.1. Result of Character Appraisal Analysis

Buildings along the riverbank have primary orientation towards the street (not the river). There is a space between building and riverbank called transition space. Transition space serves as household activities with separating walls or vegetation on each house. It means that the ownership of transition space is private because people can not access from the outside. They also can not access from one transition space of home to another transition space since the wall and vegetations separate it. The low of maintenance and no walking tracks along the riverbank causes some environmental issues such as flooding and land erosion. In order to avoid the flood and land erosion, local people are cooperating to construct the embankment made of sandbags. It reflects that the familiarity of local inhabitants is very high because they have the sense of belonging of Kampong and have the same thought in creating comfortable and humane environment (bonding arising from the equation and economic value).

Streets inside kampung connect urban hubs in the City center to the sub-precinct which refers to the new residential housing complex and Mangrove ecotourism area in the eastern side of Kampong. No wonder many vehicles passing by on the street cause loss of public space for local people. There were a group of children running on the street, playing a kite and other traditional games. But now, as affected of the high flow of traffic there is no place to play for them. Parents prohibit their children to stay out of the house, and

make their own house becoming a simple small playground. High flow of motorized vehicle also causes air pollution and decreases the value of urban health.

Rapid urbanization in Kampong has emerged informal economic sector activities such as home-based enterprises which are able to find in this kampong including *tempe* (fermented soybean patty) maker, small grocery stores for daily needs, food stalls, and craft maker from Mangrove fruits performed by local inhabitants. *Tempe* maker choose living near riverbank in order to dispose liquid waste of soybean to the river. Therefore, the role of river for them is very significant. While small grocery stores and food stall are established in order to fulfil the daily needs of local people because the location of district market is far enough to achieve. *Tempe* maker, food stalls and grocery stores of daily needs can be profitably correlated each other. As an example, *tempe* maker as producer of *tempe* can collaborate with small grocery stores as distributor to the local people. It can shorten the distribution time economically and keep the kampong lively since the activities are always arousing.

Those types of home-based enterprises are mostly undertaken by low-income residents. Some of them are supported and supervised by City Government (department of Agriculture) especially those who are working in the Mangrove material based craft. Not only do the local people produce syrup and fruit jam made of Mangrove fruit, but also they are innovating *Batik* (traditional clothes with certain pattern and technical process) by applying an image of Mangrove and its biota as a motif, so that they call it as *Batik Mangrove*. Together with Mangrove ecotourism, *Batik Mangrove* could be an attractive point as major opportunity for Kampung Wonorejo Timur.

Character appraisal shows characteristics and impression which are perceived by researcher and respondents in the kampong Wonorejo Timur as research area. Characteristics are divided into two points: positive and negative, as well as impression which are divided into two points: positive and negative. Positive characteristics focus on the strength owned by kampung Wonorejo Timur, while negative characteristic focus on the weakness and problems faced by local people. Positive impression concern to opportunity of Kampong to be more developed, and the negative impression is a threat that will be faced by community in the future. The description is shown on Table 3.

Table 3 Characteristic and impression of Kampung Wonorejo Timur

Positive Characteristics	Negative Characteristics	Positive Impression	Negative Impression
<ul style="list-style-type: none"> • Strategic location; • Close to Mangrove Ecotourism area; • Kampong Improvement Program from Government comes to the Kampong. 	<ul style="list-style-type: none"> • Mostly are middle low-income people; • Streets with lots of motorized vehicle passing by. 	<ul style="list-style-type: none"> • The simple riverfront design but attractive by providing public space and walking tracks along the river and altering the building orientation facing to the river. 	<ul style="list-style-type: none"> • New residential housing complex in the eastern side of Kampong give an impact on high traffic on the street inside Kampong.

(Analysis, 2015)

4.2. Result of SWOT Analysis

Characteristic and the impression obtained from character appraisal analysis are categorized into part of SWOT analysis: strength, weakness, opportunities, and threats. The result of SWOT analysis is strategies for re-structuring open space at the riverbank of Kampong Wonorejo Timur (Table 4).

Table 4 Strategy for open space at the riverbank of Kampong Wonorejo Timur

Internal Factors	Strength (S)	Weakness (W)
	<ul style="list-style-type: none"> - Strategic location. - Close to Mangrove Ecotourism area. - Kampong Improvement Program from Government comes to the Kampong. 	<ul style="list-style-type: none"> - Mostly are low-income people; - Streets with lots of motorized vehicle passing by.
External Factors	Opportunities (O)	Strategy (WO)
	<ul style="list-style-type: none"> - The simple riverfront design but attractive by providing public space and walking tracks along the river and altering the building orientation facing to the river. 	<ul style="list-style-type: none"> • Open space development must be easily adapted to the community in order to achieve sustainability; • Providing safe and comfortable access along the riverbank for pedestrians, and altering the building orientation to the river.
	Threats (T)	Strategy (WT)
	<ul style="list-style-type: none"> - New residential housing complex in the eastern side of Kampong give an impact on high traffic on the street inside Kampong. 	<ul style="list-style-type: none"> • Separating the accessibility between streets with high traffic for motorized vehicle and streets with low traffic for local people.
	Strategy (SO)	Strategy (ST)
	<ul style="list-style-type: none"> • Developing riverbank area as integrated Kampong with Mangrove Ecotourism area. 	<ul style="list-style-type: none"> • Emphasizing the physical boundary between built and un-built environment along the riverbank.

(Analysis, 2015)

Table 5 indicates the suitability between strategy and aspects of general criteria. Development strategy for open space at the riverbank must be easily adapted to the local people. It refers to the planning and design based on people’s need in order to achieve sustainability so that the meaning and identity of dwelling can still stand out. This strategy is classified to the place attachment which is emphasizing to non-physical aspect (socio-cultural). Strategy on the development of accessibility along the riverbank and the physical boundary between built and un-built are belong to the aspect of green open space design. Meanwhile the strategy of riverbank kampong design and accessibility are categorized to the aspect of ecological riverfront design.

Table 5 Suitability between Strategy and Aspects of General Criteria

Strategy from SWOT Analysis	Aspect
<ul style="list-style-type: none"> • Open space development must be easily adapted to the community in order to achieve sustainability. 	Place Attachment
<ul style="list-style-type: none"> • Providing safe and comfortable access along the riverbank for pedestrians, and altering the building orientation to the river. • Emphasizing the physical boundary between built and un-built environment along the riverbank. 	Green Open Space Design
<ul style="list-style-type: none"> • Developing riverbank area as integrated Kampong with Mangrove Ecotourism area. • Separating the accessibility between streets with high traffic for motorized vehicle and streets with low traffic for local people. 	Ecological Riverfront Design

(Analysis, 2015)

4.3. Design Criteria

Design criteria for open space at the riverbank area of kampung Wonorejo Timur are obtained from the result of analysis and general criteria. There are 3 (three) aspects which are mentioned before in theoretical review: place attachment, green open space design, and ecological riverfront design (Table 6). One strategy comes to the aspect of place attachment: kampung should be developed in accordance with the potential of local economy. The most potential of local economy on the kampung is home-based enterprises in order to fulfill the community needs. Therefore, the design criteria should be considered the home-based enterprises to keep the local activity arousing. The second criterion for aspect of place attachment is the open space must reflect the social cultural value of local inhabitants. The high demand for public space can be accommodate at the open space.

There are two strategies in the aspect of green open space design which are divided into three criteria design. First, space between buildings must be safe and comfortable for pedestrians. The high flow of traffic must not disturb the pedestrian or in different case, the streets with high flow of traffic must be relocated to the other space. Second, all buildings along the riverbank should have primary orientation towards the river. It aims to rise up sense of belonging to the river. Third, there must be clearly physical boundary between built and un-built at the riverbank area.

Aspect of ecological riverfront design possesses two strategies with three design criteria. The first design criterion is that riverbank should be utilized as public space, control and maintenance area. Public space can accommodate a place for interacting, playing, and relaxing. Second, open space at the riverbank must be accessible and integrated to Mangrove ecotourism area. Integrated access can be applied both visually and physically. Third, street inside kampung must serve as public space for local people.

Table 6 Design criteria for open space at the riverbank of Wonorejo Timur

Aspect	General Criteria	Strategy	Design Criteria
Place Attachment	Open space roled as a product of dwelling process influenced by natural geography, culture, and social relation.	<ul style="list-style-type: none"> Open space development must be easily adapted to the community in order to achieve sustainability. 	<ul style="list-style-type: none"> Kampong must be developed in accordance with the potential of local economy. Open spaces including streets and riverbank have to reflect the social cultural value of local inhabitants.
Green Open Space Design	Green open space must be created as urban design component.	<ul style="list-style-type: none"> Providing safe and comfortable access along the riverbank for pedestrians, and altering the building orientation to the river. Emphasizing the physical boundary between built and un-built environment along the riverbank. 	<ul style="list-style-type: none"> Space between buildings must be safe and comfortable for pedestrians. Buildings should have primary orientation towards the riverbank. There must be clearly physical boundary between built and un-built at the riverbank area.
Ecological Riverfront Design	The natural feature of river and its function should be protected, new construction may use non-structural alternative, hardscape element should be reduced, stormwater must be maintained, and It should be	<ul style="list-style-type: none"> Developing riverbank area as integrated Kampong with Mangrove Ecotourism area. Separating the accessibility between streets with high traffic for motorized vehicle and streets with low traffic for local people. 	<ul style="list-style-type: none"> Riverbank should be utilized as public space, control and maintenance area. Open space at the riverbank must be accessible and integrated to Mangrove ecotourism area. Street inside kampong must serve as public space for local people.

Aspect	General Criteria	Strategy	Design Criteria
	balancing between public access/ recreation and river conservation.		

(Design criteria, 2015)

5. CONCLUSION

There are 8 (eight) design criteria that should be considered in restructuring open space at the riverbank of Kampung Wonorejo Timur. Eight design criteria are able to solve the urban issue especially for the open space at the riverbank area of Kampong. As stated by Lang (1987), Kampong was formed by spatial behaviour of local inhabitants. It has also been done in kampung Wonorejo Timur where people who occupy riverbank create their local environment and characteristics. Considering the importance of restructuring open space at the riverbank area and the necessity of public space for local people, the most urgent design criteria to be applied is there must provide public space along the riverbank and recovery the traffic on the street inside Kampong as public space for local people.

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