Kalanganyar River, Sidoarjo Regency, Indonesia as a natural urban catalyst, living place or society pest

F Mutia*, E Elviana and A N Yunisya
Department of Architecture, Universitas Pembangunan Nasional “Veteran”, Jalan Rungkut Madya, Jawa Timur, Surabaya 61254, Indonesia

*Corresponding author: fairuzmutia.ar@upnjatim.ac.id

Abstract. River as a water source became the most important part of Nusantara’s Architecture. Unfortunately, Kalanganyar River, Sidoarjo Regency, Indonesia has become a scapegoat for serious urban problems. Regarding the potentials as an urban catalyst, the function of the river varies, as a junk-space although in many parts of it, is a centre of life. This research is qualitative research with phenomenology approach. Character appraisal was conducted to analyze non-physical aspects. The physical aspects then analyzed through a walkthrough analysis. The results showed that as an urban catalyst, Kalanganyar River did enhance their surroundings to be more livable and giving a characteristic of the coastal area. The utilization of natural potential in the form of water banks is the main focus of coastal architectural characteristics. The rapid development until now should make the Government should rethinking again about the regulations how far it can save the nature of the river.

Keywords: Bahari architecture, coastal area, Nusantara architecture, river development, walkthrough analysis

1. Introduction

A river is an area that human and animals naturally flocks. This phenomena comes from the needs of water in our life, body, and also daily activities. River as a water source for a very long time ago became the most important part of Nusantara’s Architecture’s development. The development of cities in the northern coast of Indonesia is rapidly growing, such as Tuban, Gresik, Lamongan, even Surabaya. Apart from the coastal sea, the Brantas river is one example of the use of rivers even since the era of the Hindu-Buddhist Empire. The location of Trowulan which is thought to be the capital of Majapahit is also flanked by water canals [1]. A combination of culture that is quite vibrant also occurs in coastal cities, which utilize natural potential in the form of water banks as a means of living.

The use of the term bahari architecture [2] is increasingly stretching. This is due to the very high frequency of the use of aircraft and land transportation, thus ignoring the convenience of our transportation being cut off due to the sea. The physical boundary that characterizes the island nation and the maritime country seems increasingly biased and ultimately impacts on the degradation of the value of Indonesia as a maritime country.

Moreover, some rivers are found in Indonesia, for example in the Siak River the main use of river water by residents who live on the banks of the river is for raw water in meeting the needs of bathing, washing and latrines (Mandi – Cuci- Kakus (MCK)) that are used directly [3]. This is very much true in Indonesia. In fact, the use of river water that is no longer good in water quality is still used for
bathing, washing and latrines. Water use like this also correlates with spatial use along the coastal river.

Similar to what happened in Kalanganyar Village, Sidoarjo Regency, Indonesia, coastal rivers are widely used both for its space and water. Some edge points are used for the initial processing of marine products, the place to lean the ship on, and also even as a dwelling. This shows that not only because of limited land, but because of the level of their need for the river, access will eventually put the community using the river.

But the intriguing question at this time is, why is it - as if the life of the Archipelago community, which is said to be a maritime community, separates people's lives from the water's edge. Illegal settlements that are usually attached to the river banks are used as a precedent for something very disturbing. Some illegal settlements must be demolished, and replaced with more public use of river banks, namely parks and passive green open space. Mostly, when the occupancy function is removed, the function of the waterfront becomes less popular.

The river plays an important role for human life, especially for the archipelago. River banks become an attractive area and become a magnet for life. Indirectly, when referring to the criteria of the urban catalyst [4] can it be said that the river is a natural urban catalyst? If indeed he is a natural urban catalyst, why do rivers eventually become stepchildren, and are separated from humans?

The physical characteristics of settlements as coastal settlements are characterized by collective activity as fishermen [5]. Fishermen's activities are used as residential identities as fishermen's settlements which are implemented in the utilization of space both personally in one dwelling, and communal space along the coast in residential areas. Therefore, it can be concluded that the utilization of natural potential in the form of water banks is the main focus of coastal architectural characteristics, while the culture of coastal city communities is a manifestation of the pattern of behavior and social structure of coastal communities that form the architecture of the coastal city. The architecture of coastal cities has specific characteristics with various forms of alloy from the form of a mixture of immigrants (Chinese, Arabic and Dutch) and Javanese culture [6].

2. Methodology
The purpose of this study is to assess whether the actual potential and problems of the banks of the Kalanganyar River, Sidoarjo Regency, Indonesia. This issue discusses the relationship between the relationship of the river as a magnet for human life, whether it is a natural catalyst or just as a place that only passes by. This research is a qualitative research. The chosen approach is phenomenology [7]. Character appraisal analysis techniques [8] were conducted to analyze non-physical aspects of potential mapping and river bank identity. After mapping potentials and problems, this is then read according to synchronic reading [9] with the principles of urban catalyst and some principles Bahari architecture or Nusantara architecture. The physical aspects then analyzed through a walkthrough analysis and typological analysis visually - spatially the area. This is then analyzed from several government policies related to river borders and the potential for using riverbanks.

3. Results and Discussions
3.1. Urban Space Utilization
The waterfront area of Kalanganyar Village is an area bordering the river and the sea. The village which has an area of 67% aquaculture is very dependent on its natural conditions as a living power of the community. The use of rivers and seas is an intimate part of the village community, which is predominantly Muslim.

The river that flows in Kalanganyar Village is from Brantas tributaries. This water flow has a long journey, the upper reaches Mojokerto area. This condition resulted in carrying some mud deposits and also garbage not only from the surrounding environment but also from previous villages. Many times garbage in the form of household waste such as mattresses which eventually made the river experience siltation and pollution. In Kalanganyar areas, the river used by residents as a fishery product loading
area, housing, and even simple stalls. Some interesting uses are the use of river areas as livestock cages. This explains that land use in riverbank areas is important for the survival of the community. The diverse kind of utilization in river banks is a characteristic of coastal communities.

The farther the residential area of the river, the more coastal characteristics are also lost [5]. This can be seen in the area near the Village Head's Office. In this area, there are no coastal characteristics that can be seen in terms of land use, because it does not come into direct contact with rivers or sea banks. The orientation of the building faces the environmental road and secondary arterial road. They were using a colonial style rather than “pesisiran” style (coastal style). This kind of existing conditions can be shown below (Figure 1).

![Figure 1. Existing conditions of (a) East Area of river and (b) West Area of river](image)

3.2. Meaningful urban design
In urban space morphology there are several elements that need to be studied in assessing the interrelationship between buildings and urban fabric, including plots and lots typology, road typology,
and building open space typologies [10]. This is very limited, what if there is a river, a pond, a lake next to the road, which inevitably indirectly affects the pattern and morphology of the city. The riverscape approach is also more focused on landscape, so there is less discussion about the shape of urban space that is directly related to the river. Urban design approaches usually focus on the morphology of the city space. The approach to reading urban space should develop, and begin to pay attention to the approach of urban fundamental challenges, urban scales and complexity, and interdisciplinary methods. The fundamental aspect of urban space is human activity. Human behaviour and its movements shape the morphology of the city [11]. So if observed in the pattern of human behaviour, there are several typologies of human behaviour and rivers in Kalanganyar, both seen physically and non-physically.

3.3. Intangible character appraisal

Up influenced by differences in talent, interests, experience, knowledge and intensity of feelings and environmental situations. Attitude is one of the elements of personality that must be possessed by someone to determine their actions and behave towards an object accompanied by positive and negative feelings [12]. Of course, this then becomes the rationale for addressing the Kalanganyar River, how is the “attitude” of the human being fostering its nature?

In responding to the nature, Nusantara communities initially was a polite man [13]. Now, with the increasing level of consumption and human materialism, humans finally have to exploit nature as much as possible. There is no more balance of the universe that is characteristic of archipelago architecture [5]. This unbalanced pattern of the use of nature becomes very crucial for the people themselves. Nature is damaged, finally, humans will be hard to live well. In fact, humans have a destructive tendency [14] if they cannot understand or read properly their environment.

At some points of the riverbank location, there are some residents who inhabit the riverbank permanently. This is indicated by the existence of the bathing, washing and latrines (Mandi – Cuci-Kakus (MCK)) area which is built using organic material, which is located on the river. According to one respondent, when they were small in the 1970s, river water was still very clear and was used for all human needs. This utilization also penetrates into the children’s play area, which is where the public spaces have been done. However, what is happening now is different.

This also applies to the behaviour of people living on the banks of the Kalanganyar River. In the use of rivers and water, almost 90 % of respondents who inhabit the coastal area admit that they use the river as their daily needs. Those who live on the banks of the river make maximum use of river water for bathing, washing and latrines (MCK). For cooking, they no longer use river water, because the level of clarity and goodness of water is minimal. They buy water that is usually sold around. This shows that there is a degradation of river water utilization in human life. The river is only considered as a garbage disposal area (Figure 2), even at some points of plastic waste and household garbage can be seen filling the river area. The river area that still looks natural with mangrove trees is only in the area of rice fields and salt ponds, where there are no residential areas there. This shows that there is human inadequacy in treating nature, so naturally, that is initially good becomes very polluted and bad.
This condition if according to the place attachment theory [15] becomes relevant to how humans depend on their environment, including the use of their fisherman’s background (Figure 3). This aspect of dependence does not directly become a consideration in planning and decision making [16]. Not only harms nature, but humans also unconsciously harm the built environment that they created themselves. With the behaviour of dumping garbage directly into the river, the accumulation of garbage on the riverbanks, this alone makes the river area become very polluted. Not to mention the upstream area, which is still within the same sub-district, many factories were established. It is not impossible, that the processed water from this factory also flows in the same river. In the end, the Kalanganyar River became a "dumping ground", which became very low in water quality, turbid, and not suitable for consumption.

When these intangible conditions become a new form of environment, humans will respond with new ones. Humans finally felt that they could no longer exploit the Kalanganyar River water as a means for drinking and cooking, but still continued their irrational occupation using river water as bathing, washing and latrines (MCK) and cleaning the catch from the sea (Figure 3). There is no sense of ownership to be able to harmonize relations with nature, at least not to make the river area a living trash can. In fact, if traced over a long period of time, the river comes first, and humans are given a place to live together and use each other wisely.
3.4. Overview of river side regulations

In the Minister of Public Works and Public Housing Regulation No. 28/PRT/M/2015 concerning Determination of River Rows and Lake Lines, undisturbed rivers should have river border distances up to 10 m. In fact, it shows different things. River’s borderline is not valid, not only in the downtown area but also in Kalanganyar. In establishing river protected areas, communities cannot follow well, because these regulations are present later than the culture of existing coastal communities. The use of river banks as an area of fish drying, fishing, and loading dock resulting from the sea becomes an important point and also as a characteristic of coastal villages. If activities characterized by the need for this river are eliminated, following the direction of the Ministry of Public Works, then what is left of the coastal villages? What kind of activity eventually replaced the unique nuances of a coastal village that relied on the river as the foundation of this life?

The permitted uses are only for utility and tourism, while the community also needs to use the river border area as an important area for their survival. There is a need for a review of these regulations so that their implementation can be carried out maximally and there is a unique collection of community activities as a means of sustainability of riverbank areas. Utilization such as buildings that do not use the brick structure and stone foundation times are still considered very safe and environmentally friendly. Utilization of the pier and deck loading of fishery products are also able to give colour to the river. With this, the use of organic materials is the choice and in accordance with the nature of the archipelago and the characteristics of the archipelago community in fact.

3.5. River as tangible-intangible urban catalyst

Water and land are sources of life for humans. On all part of the earth, life begins with farming, relying on land and plants that it grows with water to be managed together [14]. This indicates that water as a source of life has become an important magnet of life. The term urban catalyst, comes from the catalyst term that is popularly known in the world of chemistry. Catalyst is some material that speeds up chemical reactions [17]. With a helping hand from a catalyst, molecules can now be interacted with now in seconds. With the same thoughts, in order to accelerate the growth of an urban area, an urban catalyst could be added, and be able to become a regional generator [4]. In its own architecture. Urban Catalyst is not necessarily a physical form. It could be that he is something intangible, and they are something primary in the process of transforming the development and development of parts of the city [18]. This main element then accelerates the process of urbanization and exemplify the process of urban transformation itself. Urban catalysts that can be tangible or intangible elements, cultural flagships, transportation hubs, parks, urban development policies, urban events, or sets of guidelines. If an urban catalyst can be something intangible - tangible, the Kalanganyar River, which is able to make a change in the lifestyle of its people can also be said as an urban catalyst, both "physical" as a river or "non-physical" as a natural energy that provides livelihood.

It is more accurate to describe an urban catalyst as a smaller element or a group of elements, a building and the space around it [19]. An urban catalyst should be an element that is shaped by the context in which it is placed, and should in turn shape that context, with the purpose of reviving the urban fabric. There are three citerias of urban catalyst [19] as follows:

i. First, the catalyst should enhance the physical condition of the existing urban fabric around it

ii. A catalyst not only improves physical conditions, but these changes should also address the social, political, and economic context of the project

iii. Catalytic reactions are limited in scope, thus they do not damage their contexts

If it is only viewed from a physical perspective, the Kalanganyar River is like a means for humans to fulfill their primary needs, namely water for life. If the function of the Kalanganyar River is only this, then the river has long been inhabited by its people. But the Kalanganyar River is different, besides being an urban catalyst that is tangible, it is also meta-empirical. The presence of the river becomes a lasting inner connection with the community. Even though they already have occupancy on
the mainland, the Kalanganyar residents still consider it necessary to live "temporarily" or permanently around the river.

3.6. Visual–spatial character analysis
Sternberg relates catalysts to “activity generator” and “anchor”. A catalyst is essentially an activity generator, but not all activity generators act as catalysts [19]. In determining urban catalyst criteria in Kalanganyar River, a walkthrough analysis [8] was conducted with linear side view techniques [9] to determine more detailed mapping of visual-spatial that already change their space. The aspect of observation is physical, the use of the riverbank space This also affects the shape of the visual characteristics of the building. Using presentation data in the index card [9] the visual aspect of the building is then explored and studied whether there are differences in character between areas closer to the coastal river and those that do not. Taken three observation points which are considered to have extreme differences in the visual-spatial conditions of the region

Physically, from the analysis, it can be concluded that there are differences in style usage and building style. The majority is on the east side of the region, which is further from the coastal area, the style used is mostly Dutch colonial style, which consists of Voor 1900 and NA 1900 [20]. In the transitional area, many permanent and non-permanent buildings use modern styles, for space efficiency and material. In areas close to the coast, as well as directly adjacent to rivers, the use of coastal architecture with the characteristics of the use of stage structures is the main choice. This indicates that there are different cultures and ways of life for each individual who lives in the area.

By using three criteria of urban catalyst below (Figure A, Figure B and Figure C), the three spots that have already analyse had differences, but it did do as an urban catalyst. River as a natural urban catalyst making the character of a coastal area subtler, but it only does when it synergizes with the activity of its people. Looking at spot one, people can’t relate to the river because people didn’t use it anymore as a way of living. They only build their home but has no relations to the river. Spot two and three did meet our expectations more. As the river did enhance their surroundings, the way their people live depends on the river. It makes the area has more characteristics and having a different vibe from any other urban space in the city.

Therefore, it can be concluded that the utilization of natural potential in the form of water banks is the main focus of coastal architectural characteristics, while the culture of coastal city communities is a manifestation of the pattern of behavior and social structure of coastal communities that form the architecture of the coastal city. The Kalanganyar River as a natural urban catalyst should aim to be more dependent to its nature, because of fishermen’s loading dock, a tiny fish shop, and also the natural way for preserving the fish using the sunlight, the catalystic effect is more relatable to the unique development of the area. When the rapid development until now, still used the same river again and again government should re-thinking again about the regulations, is it really necessary to demolished the non-permanent building such as fisheries stalls, loading dock, and drying fish area to only fulfilling the government regulations, without thinking further about the unique catalyst effect that the river had.

4. Conclusions
As an urban catalyst, Kalanganyar River did enhance their surroundings to be more livable and giving a characteristic of the coastal area. If viewed through aspects of human behavior like this, it seems clear that it is no longer a matter of whether or not humans live on the river banks, but rather the ongoing pattern of river use. The river as a natural urban catalyst should be a trigger for its region to always grow and develop, but this development needs to be controlled. It is no longer a human being who lives on the banks of a river, but the pattern of human utilization that needs attention, will the river remain as its nature to become a natural urban catalyst or even become a mere social waste and exploitation object of materialism.
Acknowledgments
This research was supported by Universitas Pembangunan Nasional “Veteran” Jawa Timur. The authors thank their colleagues from Architecture Department who provided insight and expertise that greatly assisted the research, although they may not agree with all of the interpretations/conclusions of this paper. The authors are also immensely grateful to reviewers of ICEA 2019 for their comments on an earlier version of the manuscript, although any errors are our own and should not tarnish the reputations of these esteemed persons.

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Appendices

Serial Vision Analysis

Activity:
The majority of activities vary, from socializing, worshiping, to going to work. No activities related to the coast were found.

Vegetation:
Many vegetations consist of shade trees in the form of mango trees, and some ornamental shrubs

Building:
The majority of buildings use modern styles and styles, not seen using coastal architectural styles and styles

Pedestrian way:
The pedestrian way has no special lane, one with the vehicle lane

Road Conditions:
The road conditions are good, most of them are asphalted and paved but do not look like coastal

Signage:
Signage that is characterized by a coast is less visible, there is only one gate at the village boundary as a form of marker for coastal tourism villages

Figure A. Visual-spatial analysis spot one
Figure B. Visual-spatial analysis spot two

Serial Vision Analysis

Visual-Spatial Analysis

Enhancing their surrounding (Physical):
The majority of buildings use modern styles, a little seen using coastal architectural styles and constructions. Mostly used colonial/dutch style as building type choices, from NA 1900 to Voor 1900 (Handinoto). Many vegetations consist of shade trees and some ornamental shrubs, near the river there is a little typical coastal vegetation such as mangrove trees. Signage that is characterized by the coast is less visible except for signage shops selling processed fishponds. Their surrounding affected by the river because many fisheries stall found in here.

Enhancing their surrounding (Non Physical):
There are several activities that are characterized by the coast, namely selling fishing equipment and also selling processed milkfish (ponds). Many people work as fisherman and also having some milkfish ponds (aquaculture). It means that the river enhances their surrounding non physically.

Damaging their Context:
The river did playing a main role here, but not too much seen in its physical aspect. It is subtler if seen thoroughly inside their non-physical aspect. It didn’t damage their context, instead of giving it a colour as a coastal area development.
Serial Vision Analysis

Visual-Spatial Analysis

**Enhancing their surrounding (Physical):**
The majority of buildings use modern styles and styles but use local materials. Some buildings erected on the riverbank use coastal structures (stage). Many vegetations consist of shade trees in the form of mango trees, but there are much more mangrove trees as a feature of coastal vegetation. Signage characterized by the coast looks more, namely signage stalls and ponds. It means that the river enhances their surrounding physically.

**Enhancing their surrounding (Non Physical):**
The majority of its activities are characterized by the coast, namely selling seafood / fishponds, selling processed fish from the sea/ponds, becoming a farm manager, and drying fisheries from the sea or ponds. Many docks that laying in the riverbank is used as a loading dock of fisherman from the sea. The loading dock also sometimes used as a fisheries stall. It means that the river enhances their surrounding non physically.

*Figure C. Visual-spatial analysis spot three*