

Living with Water: Spatial Mechanisms of Coastal Communities

(Hidup dengan Air: Mekanisme Ruang Komuniti Pantai)

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ABSTRACT

This paper introduces spatial characteristics of the built environment systems in coastal communities. People in Morosari, Demak, Central Java one of the societies that always have to deal with water as part of their everyday life. The way how peoples respond to sea tidewater in any situation gave new insight into sustainable urban design strategy. This study aims to explore various spatial mechanisms operated by the people to reveal how the system works together. We proposed that the exploration of various mechanisms done by people when living with water may bring the possibility to expand the discourse of spatial systems on water resiliency. This study used a qualitative method in collecting data through observation, interviews, and video recording. The analysis is carried out by exploring the everyday life of the community that considers water as part of the living system. This study found three spatial mechanisms in the coastal environment system held by people when dealing with the water: (1) everyday spaces separation based on reading nature, (2) plug-and-play operation carried out both in their domestic area and neighborhood, and (3) leveling control by the material system. The finding of this study also presents another form of water resiliency that is constructed by the spatial system in the coastal environment

Keywords: Spatial mechanism; coastal community; living with water; resilience; everyday life

ABSTRAK

Kertas kerja ini memperkenalkan ciri-ciri spatial sistem persekitaran binaan dalam komuniti pantai. Masyarakat Morosari, Demak, Jawa Tengah merupakan salah satu masyarakat yang selalu berhadapan dengan air sebagai bagian dari kehidupan sehari-hari mereka. Cara bagaimana orang ramai bertindak balas terhadap air pasang surut laut dalam apa jua keadaan memberi gambaran baharu tentang strategi reka bentuk bandar yang mampan. Kajian ini bertujuan untuk meneroka pelbagai mekanisme spatial yang dikendalikan oleh orang ramai untuk mendedahkan bagaimana sistem berfungsi bersama. Kami mencadangkan agar penerokaan pelbagai mekanisme yang dilakukan oleh manusia apabila hidup dengan air boleh membawa kemungkinan untuk mengembangkan wacana sistem spatial mengenai ketahanan air. Kajian ini menggunakan kaedah kualitatif dalam mengumpul data melalui pemerhatian, temu bual, dan rakaman video. Analisis dilakukan dengan menerokai kehidupan seharian masyarakat yang menganggap air sebagai sebahagian daripada sistem kehidupan. Kajian ini mendapati tiga mekanisme spatial dalam sistem persekitaran pantai yang dipegang oleh manusia ketika berurusan dengan air: (1) pemisahan ruang harian berdasarkan cara membaca alam, (2) operasi pasang dan main yang dijalankan di kawasan domestik dan kejiranan mereka, dan (3) kawalan meratakan oleh sistem bahan. Dapatan kajian ini juga membentangkan satu lagi bentuk ketahanan air yang dibina oleh sistem spatial di persekitaran pantai.

Kata kunci: Mekanisme ruang; pantai komuniti; hidup dengan air; ketahanan; kehidupan seharian

INTRODUCTION

This paper aims to provide new insights into sustainable urban design strategies, especially in coastal areas through exploration of how people respond to sea tides. The Morosari area, Demak, Central Java is located on the coast where the people always have to deal with the tides of seawater. The daily life of the people in this environment involves a lot of seawater as part of their spatial practice. The existence of houses in this neighborhood is oriented to the river and sea. The fronts of the houses are directly facing the river, and some of the houses' backs are connected to the sea. The water level of the river can also rise and fall following the level of seawater. It can be indicated by the boats that are usually parked at the edge of the sea, to be brought up to the front of the house when the tide is high. This condition allows the fishermen to easily unload the fish caught. The mechanism used shows that the community in this environment survives with strategies for survival against natural changes that vary from time to time (Allan 2013). This strategy expands the understanding of architectural resilience not only to minimize our impact on the natural environment but how to survive strategies of nature in everyday spatiality. The spatial system that is built shows continuity in survival with unpredictable nature.

The discourse on sustainability in the built environment area is commonly concentrated on how to minimize the daily impact on the environment. The discourse has not seen much sustainability from the perspective of spatial strategy, especially in the coastal environment. Resilience in the coastal environment should be considered as one of the sustainability strategies by emphasizing the principles of design and planning as a reference for infrastructure development (Walker & Salt, 2006). Currently, the dominance of environmental change is widely discussed as a form of sustainability that prioritizes human activities (Quigley et al., 2018). Human activities in a built environment can show various strategies that are carried out as a form of appropriation of a condition (Giddens & Sutton 2011; Highmore, 2002). This system can be seen as a natural strategy that exists in the built environment as community resilience and can be developed as an approach to the concept of sustainability (Crowe & Foley 2017; Dixon 2007).

The concept of sustainability is an issue continuously discussed in various fields, this study attempts to see how sustainability occurs in coastal areas, especially how to regulate its space. Sustainable discourse involving coastal areas always discusses building structural systems, water-based structures that can be imaged as such are also considered the most resilient urban forms to respond to the

impacts of climate change (Hamin & Gurran, 2009). Numerous discourses involve technology as an approach to sustainability. This argument contradicts what Carmona (2016) reveals: however, as others have argued, sustainable approaches to the city should avoid the misconception that dealing with the environment is merely 'an engineering problem' to be overcome by technology. Instead, key 'precepts' for shaping places sustainably will need to combine a technological emphasis on form and impact with an equal focus on people and place (p.31).

The argument is the reflection of an observation of how the inhabited system of society will gain knowledge about a sustainable system that interposes people at first. This article explores various forms of resilience in coastal communities by observing how people use their space. By focusing on the spatial system, this paper aims to see the spatial strategies carried out by a coastal community that always lives with water.

METHODOLOGY

This research was conducted using a qualitative method with a case study in the Coastal Area of Morosari. The area is located in the city of Demak, Central Java, Indonesia, precisely in the coastal area of the north-sea of Java (Figure 1). The selection of this case study includes several coastal areas with lifestyles that reflect living with water. The presence of tides in this area has become part of everyday life for the people in Morosari. Qualitative methods are considered relevant in exploring this phenomenon as agreed by many naturalists in this field (Creswell, 2009; Wang & Groat, 2013). The research method used is in accordance to the qualitative method described by Wang and Groat (2013) emphasizing more on daily activities that occur in an environment and does not only focus on quantities that are easy to measure. This study argues that an environment can be seen as a representation of the conceptualization that underlies the user in responding to his space (Creagh 2018).



FIGURE 1. Geographical map of Morosari, Demak

Data was collected through direct observations at high sea levels and during normal conditions, timing is an important aspect of the observations. The coastal community in Morosari Demak has a tidal schedule obtained from the Regional Meteorology and Geophysics Agency, this makes it easier for researchers to collect data. In addition to direct observation, interviews were also conducted to reveal in detail the spatial mechanisms carried out by the community. Interviews were conducted using a sampling method of the people living in these locations with a total of 20 respondents. In addition, photos and video recordings were taken to assist in mapping the area as an aid in data compilation.

The analysis was carried out by exploring people's daily lives with a focus on spatial mechanisms that consider the existence of tides. Everyday life can describe space more specifically by showing a system of connectedness between social and material phenomena (Popov & Ellison, 2013). This study emphasized the daily spatial strategies of coastal communities in responding to natural phenomena. The reading of the data obtained through data collection, categorized the data into two conditions, when the sea level is high and when conditions are normal. By reading it twice, we could obtain how the spatial changes occurred in the case study. The analysis was continued by making a diagram of each finding to see the spatial mechanism carried out by the community. Based on this method, various spatial mechanisms can be found to describe the way of life of coastal marine communities in dealing with tides.

RESULTS AND DISCUSSION

The observations found three daily spatial mechanisms of coastal communities in considering tides in the Morosari Village, Demak. The first one is the division of space based on the reading of nature. Second, a plug-and-play system that carried out in domestic and public spaces. Third is level control through the material system. These three findings will be explained further in the following sections.

THE DIVISION OF EVERYDAY SPACES BASED ON READING NATURE

The area of Morosari, Demak has a unique environment since it is located on the coastal makes this area surrounded by seawater. The condition forces people to regulate their spatiality based on the presence of seawater. The sea and river become the main front-back orientation of the house. The houses face each other and are separated by roads and rivers. Meanwhile, many houses are also separated by seawater. The space between them is utilized by the people as an expansion of activities related to supporting activities. The yard of the house in this area is mostly filled with water and some parts of house is above the water. Animal cages which are generally located in the yard of the community are placed behind the house, above the water. They put the cage, kitchen, and service above the water so that it will be easier to clean. The spaces used for domestic activities are located inside the house at a high level to anticipate the

surface of the water. While the outdoor space that is directly in contact with water is widely used as a place for raising fish. Fish management optimizes the space around the house by making various spatial arrangements that utilize the water around the house. It can be seen in house A, fish farming activities are carried out by dividing the fish pond

with several arrangements. The small fish are placed in a basin for several days, then transferred to a pond made from nets and tied with bamboo, located in seawater next to the house. After 2-3 weeks it will be moved to the back with a deeper pond and lined with some other nets (FIGURE 2).



FIGURE 2. Everyday condition of Morosari, Demak

The space arrangement below shows how people in this area utilize nature as a system of division space by prioritizing the fluctuation level of seawater as the main consideration (Figure 3). How people read nature has become their daily life. They lived with the water level, not as a problem that they have to avoid. Of course, the appropriation achieved by dividing the daily space based on the reading of nature can also be seen as a form of community resilience in coastal areas. This expands the understanding of the resilience of the region, especially on the coast where the tides are a part of everyday life.

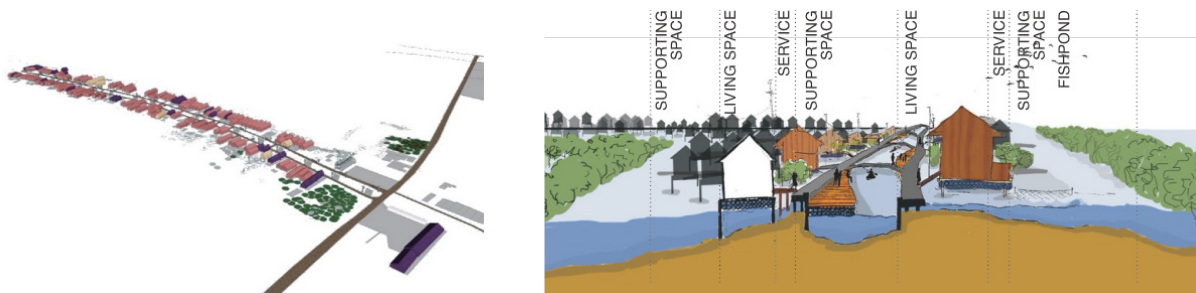


FIGURE 3. Space arrangement of Morosari, Demak

PLUG-AND-PLAY MECHANISM CARRIED OUT IN THE DOMESTIC AND PUBLIC ENVIRONMENTS

The coastal area of Morosari village has tidal characteristics that can be read geographically. In the morning the sea water level is high, then it goes down at noon. The level of water will go back to rising in the afternoon. The unpredictability of sea levels forced the community to have a spatial strategy for adjusting the rise and fall of seawater. One of the strategies is found in the form of a bridge that can be dismantled according to the tides. The position of the house on the edge of the river makes the house only accessible via a bridge. The bridge is made of bamboo material and can be dismantled.

Based on observations, there are two types of bamboo bridges that connect residential houses to the main road, the first is a bridge that can only be passed by people and one that can be passed by motorized vehicles. Bridges that can only be passed by people are arranged on bamboo which is arranged closely together and supported by another bamboo by tying them to bamboo stakes into the river. This makes it possible to dismantle the bamboo that

serves as a surface for people to walk on when the sea level rises. Bamboo is taken by pulling bamboo sticks from one direction to be stored in front of the house and put back when the water recedes.

The second type is a bridge made of bamboo that can be traversed by vehicles, with a bamboo support structure tied and plugged into the river surface for passage made of bamboo that is cut in half and woven and then tied with an area of 2mx2m then arranged on a whole bamboo structure. The woven bamboo binds each other with ropes that can be dismantled according to the water level. If the water is very high, then the pair of woven bamboo is dismantled and placed in front of the residence to function as a water barrier. If the water recedes, the webbing is rearranged into a motorized vehicle bridge.

The bridge assembly system in the coastal area of Morosari shows the community's ability to create a plug-and-play mechanism as the way how they adjust for their everyday space. This mechanism can be understood as a form of community resilience to the erratic tides of the sea. The plug-and-play mechanism also expands community resilience strategies, especially in coastal areas as part of developing connectivity to their residential area.

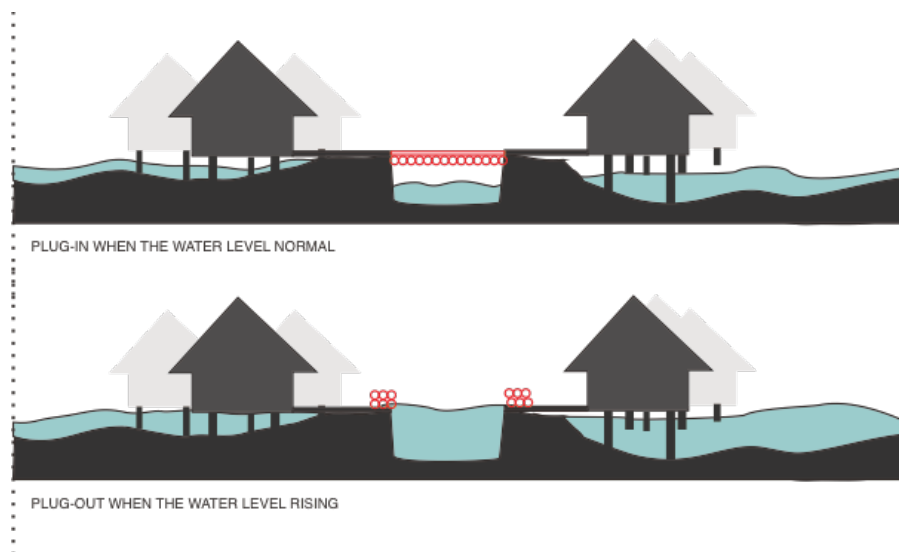


FIGURE 5. Plug-and-play mechanism

THE MATERIAL SYSTEM USED

The high tides forced the coastal communities in the Morosari Demak Region to consider materials used in supporting conditions that tend to change. The water surface level becomes the main consideration in choosing materials by the community. Bamboo and wood are the two main materials used in composing their space in this area. Wood is commonly used for the main structure of houses and main buildings, while bamboo is used to arrange

elements located in the public area. Wood and Bamboo can be used both separately and combined. People usually combined the two materials when there is a need for space for complex activities or critical points that are exposed to the water. The rising and falling seawater pattern makes the people of the coastal area of Morosari Demak choose the use of natural and easily renewable materials. Various materials are used by the community for different needs in carrying out their activities. Bamboo material is used as surface support at points that are always submerged by

tides. The position of the house that is oriented to the river with high and low water is uncertain, so the community does not establish permanent access. Access is in the form of a bridge that connects houses with the main access by

using a bamboo bridge. Bamboo material was also chosen by the community because it is easy to find around the location and easy to set according to the high and low tides of seawater.



FIGURE 6. Material System Used

The mechanism of using bamboo material as one of the community's strategies in regulating the level of space is indicated by the installation of pegs as the foundation of the connecting bridge from the road to the house. The bridge is one of the main daily facilities in this village because it functions as a connecting route between roads and houses that pass through the river at an uncertain level. Bamboo was also chosen because it allows for being installed according to the high and low tides of the sea. In addition, bamboo is used as a material that can withstand hot temperatures on land and survive in water. Material selection strategy as part of determining space leveling can be seen as a form of daily spatial mechanism that considers the height and low of the base surface, especially tides.

Three daily spatial mechanisms of coastal communities show that in their daily life reading nature is an important aspect part of determining its spatiality. The presence of tides makes people in coastal areas live with maneuvering between nature which is constantly changing and moving. Water is seen as the main orientation to determine its living space. In their daily life, people in coastal areas show that

resilience can be done through spatial adaptation, which can be seen by the existence of spatial systems that can transform according to nature.

CONCLUSION

From the discussion section, it can be concluded that the daily spatial planning strategy carried out by the Morosari Demak community is a form of their resilience to the tidal nature of seawater. Living with water has become part of their daily life in carrying out their activities. This paper shows various strategies for community survival as a sustainable form based on regional potential. This strategy enriched what Allan (2013) calls a strategy for survival, namely the existence of tides as part of spatial planning which ultimately indicates the existence of a sustainable system of coastal areas in this region. In addition, this paper also finds the potential to see the sustainability of the area not only from environmental impacts but also emphasizes the daily potential of the community in managing its space.

In the context of coastal areas, this paper shows that people in coastal areas have a deeper closeness to nature so every activity considers reading nature. This shows that people in coastal areas are more sensitive to spatiality.

This paper found that there are three spatial mechanisms in coastal communities that live with water: (1) The division of everyday spaces based on reading nature, (2) the Plug-and-play mechanism carried out in domestic and public environments, and (3) Material system used. This finding can provide new insight into the characteristics of coastal communities that live with water as a form of resiliency.

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