

Public Spaces in *Pulau Pasaran*: Everyday Practices and Social Meanings in a Coastal Fishing Settlement

Nova Asriana^{1*}, Martin Muljana², Guruh Kristiadi Kurniawan¹

¹Architecture Study Program, Faculty of Infrastructure and Regional Technology, Sumatera Institute of Technology, Kabupaten Lampung Selatan, Indonesia

²Landscape Architecture Study Program, Faculty of Infrastructure and Regional Technology, Sumatera Institute of Technology, Lampung Selatan, Indonesia

Corresponding e-mail*: nova.asriana@ar.itera.ac.id

Article info:

Received: 01-10-2025, Revised: 14-06-2026, Accepted: 15-06-2026

Abstract. Public space is not only a physical domain but also a cultural and social representation of collective urbanism, particularly in kampungs in Indonesia. It has grown densely due to the increasing of population and urbanisation, which has reduced the number of public spaces. This study is to investigate how public spaces in coastal kampung create function in everyday life and what social meanings for residents to attach them and how these spaces contribute to resilience, particularly fishing-based community in *Pulau Pasaran*, Bandar Lampung, Indonesia. This research employs a qualitative approach descriptively through collecting data by spatial observation and mapping public spaces practices identifying the characteristics of public spaces. The results are that public spaces in *Pulau Pasaran* are not defined by formal design but by everyday urbanism through everyday human practices. The characteristics are relational, multifunctional and adaptive to environmental change in a scarcity of public spaces. They help together to build living infrastructure for resilience to repurpose every inch of space for social or economic use.

Keywords: public space, urbanism, coastal settlement

1. Introduction

Public spaces have long been represented as a fundamental need for communities to facilitate both individual and collective social activities, interaction and cultural expression. In contrast, public spaces in kampungs are not always parks or squares as in contemporary neighbourhood. They often emerge informally in streets, docks, courtyards, and even house extensions. Urban planners, designers, and architects primarily view public spaces as physical spaces (Carmona, 2010). These spaces are adaptable, multipurpose, and deeply intertwined with everyday practices. It is not only a physical domain but also a cultural and social representation as the heart of collective urban daily life. Also, urban public space can bring a diverse range of environmental, social, and economic benefits (Whitford, 2001). Environmentally, green spaces in public spaces can enhance air quality, lessen pollution and the heat island effect, and help animals and plants survive (Shashua-Bar & Hoffman, 2000). Socially, public spaces are places where people can engage emotionally, which is important in enhancing mutual understanding and social cohesion (Kuo et al., 1998). Economically, the existence of public spaces can improve the liveability of the city to enhance the value of properties in the surrounding areas and increase economic advantages of the city (Luttik, 2000).

Kampungs in Indonesia are characterised by incremental growth, fine-grained accessibility and strong social networks. It has grown naturally and spontaneously to a dense area from buildings and street patterns (Asriana et al., 2023). In addition, it is normally recognised a unique type of settlements with poor condition physically, economically, but it is a well-socialised (Funo et al., 2002). Thus, it is brought on by the increasing population and urbanisation in kampungs, which has made denser and reduced the amount of public space.

Mostly public spaces in Indonesian kampungs are a unique because it is shared facilities within community (Setiawan et al., 2010). However, an insufficient area of public space makes dwellers to be creative, they create public open spaces to accommodate their needs for social activities in the kampung neighbourhoods based on their needs, types, and characteristic appropriately (Asriana et al., 2024). Therefore, public spaces could enhance the quality area and give the importance of behaviour improvement (Ischak et al., 2019).

Coastal kampungs in Indonesia represent unique socio-spatial landscapes where ecological adaptation, livelihood practices, and cultural traditions. For instance, *Pulau Pasaran*, located in the city of Bandar Lampung, is one such settlement that well known for its dried fish industries. This island has long been recognised as an economic hub of small-scale fisheries. Despite its economic identity, *Pulau Pasaran* embodies a dense and vibrant social life in which public spaces play a central role. In addition, this kampung is land scarcity and environmental vulnerability shape the built environment, public spaces serve as crucial part for sustaining both livelihoods and social cohesion. Thus, this study investigates how public spaces in coastal kampung function in everyday life and what social meanings for residents to attach them and how these spaces contribute to resilience, particularly fishing-based community in *Pulau Pasaran*.

1.1. Public spaces as socio-spatial practices

Public spaces are often recognised as a physical setting that enables interaction (Gehl, 2011). They are used freely and accessibly by communities to daily activities and social interaction (Carr et al., 1993). Formal public spaces are conditionally made available, like cafes, pubs, parks, public facilities, commercial spaces, community center (UN-Habitat, 2015), where people go for individual and collective public social activities (Oldenberg, 2007), called as third places (Oldenberg, 2007). Meanwhile, another prominent typology of public spaces is characterised with “in-betweenness” for contemporary informal social interactions, called fourth places (Aelbrecht, 2016).

According to the Lefebvre (1991), he emphasized that public spaces are lived and socially constructed dimension (Lefebvre, 1991). It influences the quality of public spaces to support, share values, and comfort of joyful experience to communities (Beqaj, 2016; Ischak et al., 2019). If the public spaces could not fulfil of shape the inter-relationship among other individuals, it means that public space is malfunction improperly (Siahaan, 2010). At the same time, the public spaces and users’ existence will create image and present the identity of the area (Banapon, 2018). Public spaces also will be quality indicators in kampungs neighbourhood, such as in image, comfort, continuity, usage and social activities (Carmona et al., 2008). In kampungs, public space is produced through collective practices rather than formal design. This includes informal practice, such as streets of terraces has double roles, mobility, gathering, economic, and play areas as essence of publicness.

1.2. Coastal kampungs and spatial resilience

Coastal kampungs represent a unique sub-category of settlements. Their existence and evolution are fundamentally tied to a maritime economy, where a significant percentage of the population engages in livelihoods such as fishing, aquaculture, or the processing and sale of marine products (Safeyah et al., 2021). These activities direct economic and cultural relationship with the sea and surrounding water bodies, including docks, shorelines, and rivers to be a basis of physical and social organisation. The spatial orientation mostly for communities, as seen in *Pulau Pasaran*, is powerfully influenced by the proximity to the coast with a determinant pattern differentiating them from the mainland settlements (Husin & Komala, 2024).

In coastal context is not only providing a source of livelihood but also creating specific environmental vulnerabilities, particularly from tidal floods, erosion, and tsunamis (Sriadi et al., 2022). This challenging environment necessitates creative and often informal spatial solutions, which manifest as a deeply embedded relationship between the daily lives of inhabitants and the built environment (Asriana et al., 2024; Ernawati, 2013). While coastal communities adapt their spatial practices to environmental challenges such as flooding, tides, and resource scarcity (Adger, 2000). For instance, public spaces are not only social purpose but also ecological functions, but also economic, social interaction and climate adaptation. Therefore, built environment of coastal kampungs is not static, it is in a constant state of transformation as a direct response to the environmental threats.

1.3. Public space as everyday practices

Following de Certeau (1984), public spaces in not merely physical backdrop but a lived experience, continuously produced through everyday practices (Certeau, 1984). In addition, the sociological perspective of public space views it not as a static, like a park or square, but as a dynamic entity that is continuously produced and contested through the practices of everyday life (Vaiou & Kalandides, 2009). Usually, this framework is applicable to the kampungs, where the formal planning of public space is minimal or not exist. They use “private areas” to act as “public areas and it is operated directly by kampung itself (Vaiou & Kalandides, 2009). By its nature, the kampung is a settlement where dwellers and urban poor collectively meet their daily social and economic needs.

The public life of kampung is not only defined by the type of space, but also by its temporal dimension. Spaces are not fixed in their function but are multilayered and transform based on time of day or the presence of a specific activity or ritual. For instance, *Pulau Pasaran* practices such as fish drying, net repairing, or informal gatherings generate public space as an evolving social phenomenon. This is powerfully demonstrated as coastal area, where a single physical location can serve multiple purposes. A shoreline, for example, functions as a workspace for fishermen during the day, a communal waiting area for their wives, and on different time as children playground area. This demonstrates how collective cultural, social, and economic can transform a purely physical space into deeply meaningful that is integral to the community identity.

2. Methods

This research employs a qualitative approach descriptively. The collection data includes that spatial observation is to map and document public spaces patterns and their usage, informal interviews with local fishermen, women involved in fish processing, and children using public spaces for play, and visual documentation is to photographs and sketches to capture spatial practices. These methods will be presented the factual condition of case study (Figure 2.1).

Fieldwork was conducted between March until June 2025 through a combination of behavioural mapping, observation, and informal interviews. Behavioural mapping was to identify the spatial distribution of everyday practices occurring in public or semi-public areas, including alleys, shorelines, terraces, and courtyards as gathering spaces. Observations were conducted during morning until evening periods to capture temporal variations in spatial use. Meanwhile, informal interviews were conducted with community members who actively participates in daily activities use with 14 participants, such as 2 fishermen, 2 women involved in anchovy processing, 2 women involved in drying activities, 2 women involved in sorting and packing, 3 children, 1 community leader, and 2 residents. Participant were selected purposively based on their involvement in everyday activities. During this process, visual documentation in the form of photographs and sketches was also recorded spatial conditions, where each photograph was linked to mapped observation points to ensure visual evidence for analysing space conditions.

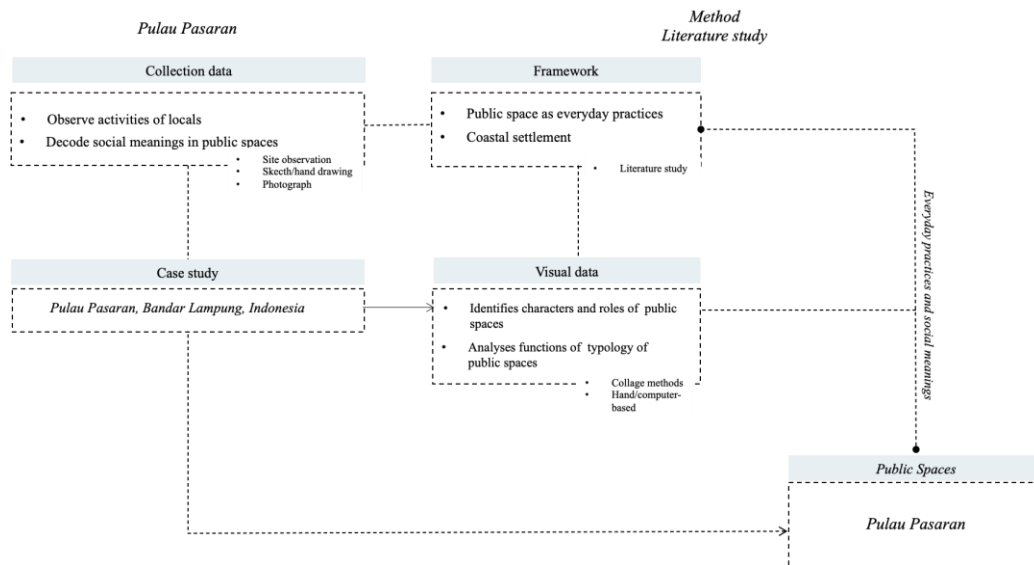


Figure 2. 1. The methodology framework (Authors, 2025)

2.1. Selection of case study: *Pulau Pasaran*

Pulau Pasaran is in the small coastal of Bandar Lampung that located in the southern part of Sumatra Island (Figure 2.2). This island is known for dried fish home industries and is proposed to be a Minapolitan area according to the Indonesian Regional Spatial Planning (RTRW) of Bandar Lampung 2010-2030. Only 12-13 hectares in area and home to roughly 1,200-1,500 folks. This kampung has a marine food product of dried anchovies (*ikan teri kering*) for their livelihoods and daily rituals for fish drying and communal labour every day.



Figure 2. 2. Pulau Pasaran location (authors, 2025)

This kampung illustrates how dense neighbourhoods can drive fundamental spatial, resilient economic, and spatial transformation. This island reveals socio-economic landscape that is influenced by the anchovy processing industry with a powerful catalyst for change. The economic stability provided by this industry results in tangible physical upgrades and changes in dwelling structures, from wooden houses to permanent houses. Despite this upgrade, this kampung is also found that limited public spaces had led dwellers to expand social life onto house terraces, yards, and narrow alleys. When plazas are scarce, residents

share the private house area to facilitate social activities, reorganising yards and corners of their homes to supports gatherings. Spatially, the clustering of anchovy processing activities is known as agglomeration feature of this kampung's morphology. This concentration of economic functions results in a distribution of socio-economic conditions across the community. The spatial organisation directly facilitates collective economic participation and social equity.

2.2. Identification of activities

To understand everyday practices in *Pulau Pasaran*, we conducted systematic field observation (Figure 2.3) based on behavioural techniques to map document activities and identify key public spaces and their temporal rhythms. Data were classified into five domains, such as economic, social/communal, mobility/movement, domestic, and environmental adaptation (Table 2.1). These allow us to capture both visible behaviours and the cultural meanings underpinning public space usage.

Based on observation, the homes within the kampung are not exclusively private dwellings, dwellers often evolve to serve multitude of functions, such as becoming shops or social hubs that are central to the informal economy and daily life. In addition, informal public space, like shorelines, becomes a workspace for fishermen on loading and unloading marine cultivation. Others, like informal green spaces for fish drying, represent collective yard or terrace by dwellers to create activities.



Figure 2. 3. Everyday practices in *Pulau Pasaran* as dried fish home industries (Authors, 2024)

This fluid and temporal use of space reflects the community's ability to adapt its physical environment to meet constantly shifting and economic needs. Regarding this, the following Table 2.1 and Table 2.2 summarise the varied social functions that are accommodated in this kampung, *Pulau Pasaran*.

Table 2. 1. Category activities (Authors, 2025)

Category	Example activities	Function	Actor(s)
Economic	<ul style="list-style-type: none"> - Anchovy drying - Fish sorting - Fish selling and trading - Boat maintenance 	<ul style="list-style-type: none"> - Core function and livelihoods support of the island as minapolitan 	<ul style="list-style-type: none"> - Adult men and women - Elder men and women
Social/cultural	<ul style="list-style-type: none"> - Religious events - Family gatherings - Informal at warungs 	<ul style="list-style-type: none"> - Show socio-spatial integration 	<ul style="list-style-type: none"> - Adult men and women - Elder men and

	- Children playing		women - Children
Mobility/movement	- Walking between houses - Movement goods - Children's play - Social gatherings	- Accessibility - Economic activities - Social cohesion	- Adult men and women - Elder men and women - Children
Domestic	- Cooking - Washing - Household chores - Fish dried packing	- Private and shared spatiality	- Adult men and women - Elder men and women - Children
Environmental adaptation	- Managing waste - Elevating houses - Preparing for tidal changes	- Resilience and ecological adaptation	- Adult men and women - Elder men and women - Children

Table 2. 2. The role informal public spaces (Authors, 2025)

Space/activity	Economic	Social/cultural	Mobility/movement	Domestic	Environmental adaptation
Piers/shorelines/docks/riverbanks	v	v			v
Alleyways/shared alleys/pavements	v	v	v	v	
Courtyard	v	v	v	v	v
House fronts/house terraces/house yards	v			v	

3. Discussion

According to the results, public space here is fluid and multiple functions. For instances, the same space use fish drying in the morning may later host social interactions, religious procession, or community discussions. This flexibility illustrates what Gehl (2006) describe as *soft edges* that this flexibility (Gehl, 2006). This is influenced by intertwining the coastal environment and the community's way of life. The phenomenon observed in *Pulau Pasaran*, where economic success from the anchovy industry leads to the physical transformation of homes from temporary wood structures to permanent ones. This further reinforces and links between economic stability and physical material upgrades. This kampung also static environment but the built form of this kampung is inherently dynamic and adaptive as a response to a changing landscape. This adaptive capacity is a key finding that reframes "informality" of this space as a form of ingenuity and self-organisation.

3.1. The piers and shorelines thresholds as collective ground

These functions as the primary public space in *Pulau Pasaran*. This area serves dual purposes, such as economic and social (Figure 3.1). Economically, this area is a workplace for men to unloading fish in the morning, and it becomes a drying field by midday, and it transforms into a communal gathering spot. Socially, residents describe the the piers and shorelines are as the heart of the island informally in gathering, chatting and celebrating, reflecting its symbolic and reinforcing as spaces of collective identity. As thresholds between land and sea, they embody kampung's dependence on coastal ecology.

This area shows spatial temporal patterns when activities will have multifunction occur for everyday urbanism. In the morning (8:00-10:00 AM), men gather at the pier to unload fish, midday women gather near pier and shorelines to sort and collect fish to transfer drying yards. Then evening, children play in shorelines.



Figure 3. 1. The role of shorelines/riverbanks as workspace area economically and communal gathering socially (Authors, 2024)

3.2. Streets as living rooms and social corridors

In *Pulau Pasaran*, narrow alleys (*gang*) function as both circulation routes, and spaces of encounter (Figure 3.2). The street is not boundary between private and public, but a gradient where domestic and communal life intertwine. It also acts as extended living rooms with children plays, small stalls, woman sit together while processing fish, and men repair fishing nets or trays. These activities illustrate the multifunctionality of streets as hybrid domestic public space. These are adaptive strategies of the community demonstrating resilience on deeply socio spatial. Public space here is not fixed but continuously negotiated, enabling the community to respond to environmental uncertainties.



Figure 3. 2. The role of streets or alleys as mobility, domestic, living rooms, social corridors and economic (Authors, 2024)

3.3. Fish-drying yards as everyday public spaces

Unlike conventional plazas or squares, fish drying yards emerge as key public spaces (Figure 3.3). While primarily economic in function, they transform into gathering points where residents converse, share resources, and collectively control fish-drying processes. These yards symbolize how economic activity in *Pulau Pasaran* is inseparable from public life. In addition, in front of houses (terraces), small courtyards and thresholds become spaces of negotiation between private and public life. Neighbours exchange food, stories, and assistance here. These micro public spaces sustain trust and solidarity.



Figure 3. 3. Fish drying yards as key public spaces (Authors, 2024)

Beyond daily use, public space is a product of continuous everyday social practices. Due to the high-density neighbourhood and lack of dedicated open spaces, dwellers repurpose, such as, alleys, terraces, and shared yards, as important hubs for social interaction, trade, and communal activities. This represent that the use of space is unwritten social contracts, high levels of tolerance among folks, and minimizing conflicts (Pramono & Dwita Hadi Rahmi, 2021). This becomes temporal dimension when a single location can serve multiple distinct function depending on the time of day. This could highlight adaptability value of kampung.

4. Conclusion

Coastal kampungs are not simply informal settlements, but they are complex socio-spatial system that demonstrate adaptability, resilience and ingenuity. This analysis, particularly public spaces in *Pulau Pasaran*, is not defined by formal design but by everyday urbanism through everyday human practices continuously. The spatial experience in this area for community is defined by a rich, multi sensorial tapestry of everyday life and environmental adaptation. The morphology of these settlements is a rational response to their coastal context with their physical form and social structures shaped directly by their livelihoods and cultural practices. This underscores the significance of public space as more than a physical category, but it functions as economic lifelines, social anchors, and resilience mechanisms. Furthermore, the public life of the kampungs exemplifies how communities can organically produce and define own spaces in the absence of formal urban development.

The findings highlight that the essence of public spaces is relational, multifunctional, and adaptive as a lived socio-spatial in *Pulau Pasaran*, where economic production, social cohesion, and environmental adaptation simultaneously and continuously. They accommodate the intertwined rhythms of livelihood, sociality, and ecology. Regarding this condition, dwellers have strong social networks to underpin kampung resilience. Engaging social capital, norms of trust, reciprocity and mutual aid enable communities to cope environmental change, particularly a scarcity of public space. Through residents' repeated practices and creativity create this public facility emphasizes cooperation and togetherness as core adaptive capacities. These traditions embody collective problem-solving on humility and teamwork. Also ensures everyone, includes rich or poor, youth or elder, helps together to build living infrastructure for resilience to repurpose every inch of spaces for social and economic uses.

This study contributes to a broader discussion on understanding of public space, emphasizing that kampung settlements challenge conventional urban design assumptions. The findings highlight how public spaces are dynamically produced through everyday practices and lived experiences. For policymakers and planners, recognizing public spaces as a socio-spatial practices suggest that resilience planning must account not only for infrastructure but also for the community practices and local knowledge that could foster a sustainable and resilient future for coastal population and their settlements. This research is

limited on a single case study. Therefore, future research could expand on this study through comparative investigations with different coastal kampungs by employing spatial analysis tools to quantitative spatial analysis techniques and integration in kampung layouts, complementing the qualitative human insights presented here, then it would further strengthen understanding how everyday practices contribute to the resilience of coastal settlements.

Acknowledgments

The authors acknowledge the cooperation of the *Pulau Pasaran*'s dwellers in the research process as well as the cooperation of the surveyor. This work was fully funded by the Institut Teknologi Sumatera (Itera), Republic of Indonesia, through the research scheme of "Hibah Penelitian Itera 2024" under contract number of 1539bt/IT9.2.1/PT.01.03/2024.

5. References

- Adger, W. N. (2000). Social and ecological resilience: are they related? *Progress in Human Geography*, 24(3), 347–364. <https://doi.org/10.1191/030913200701540465>
- Aelbrecht, P. S. (2016). 'Fourth places': the contemporary public settings for informal social interaction among strangers. *Journal of Urban Design*, 21(1), 124–152. <https://doi.org/10.1080/13574809.2015.1106920>
- Asriana, N., Koerniawan, M. D., Tambunan, L., & Paramita, B. (2023). THE EFFECTS STREET-NETWORK CONFIGURATION IN MODELLING WALKABILITY THROUGH SPACE SYNTAX. *DIMENSI (Journal of Architecture and Built Environment)*, 50(1), 13–20. <https://doi.org/10.9744/dimensi.50.1.13-20>
- Asriana, N., Rahmah, F. F., & Mezzaluna, N. A. (2024). Characteristics of Public Open Space Area in the Kampung Settlement (Case Study: Kampung Cungkeng). *Journal of Architectural Design and Urbanism*, 6(2), 63–73. <https://doi.org/https://doi.org/10.14710/jadu.v6i2.21705>
- Beqaj, B. (2016). Public Space, public interest and Challenges of Urban Transformation. *IFAC-PapersOnLine*, 49(29), 320–324. <https://doi.org/10.1016/j.ifacol.2016.11.087>
- Carmona, M. (2010). Contemporary Public Space, Part Two: Classification. *Journal of Urban Design*, 15(2), 157–173. <https://doi.org/10.1080/13574801003638111>
- Carmona, M., Magalhaes, C. de, & Hammond, L. (2008). *Public Space*. Routledge. <https://doi.org/10.4324/9780203927229>
- Carr, S., Francis, M., Rivlin, L. G., & Stone, A. M. (1993). *Public Space*. Cambridge University Press.
- Certeau, M. de. (1984). The Practice of Everyday Life. In *A Cultural History of Shopping in the Middle Ages* (Vol. 2). University of California Press.
- Ernawati, R. (2013). Facing Urban Vulnerability through Kampung Development, Case Study of Kampung in Surabaya. *Humanities and Social Sciences*, 1(1), 1. <https://doi.org/10.11648/j.hss.20130101.11>
- Funo, S., Yamamoto, N., & Silas, J. (2002). Typology of Kampung Houses and Their Transformation Process-- A Study on Urban Tissues of an Indonesian City. *Journal of Asian Architecture and Building Engineering*, 1(2), 193–200. https://doi.org/10.3130/jaabe.1.2_193
- Gehl, J. (2006). *Life between Buildings; Using Public Space* (Sixth). The Danish Architectural Press.
- Gehl, J. (2011). *Life between Buildings* (Vol. 23). Van Nostrand Reinhold.
- Husin, D., & Komala, O. N. (2024). Algorithm as a Pattern of Kampung Case Study: Cilincing Fisherman Village. *Border : Jurnal Arsitektur*, 6(2).
- Ischak, M., Setioko, B., & Gandarum, D. N. (2019). Quality Of Life Achievement Through SocioSpatial Configuration In Open Spaces. *International Journal of Scientific and Technology Research*.

- Kuo, F. E., Sullivan, W. C., Coley, R. L., & Brunson, L. (1998). Fertile Ground for Community: Inner-City Neighborhood Common Spaces. *American Journal of Community Psychology*, 26(6), 823–851. <https://doi.org/10.1023/A:1022294028903>
- Lefebvre, H. (1991). *The Production of Space*. Blackwell.
- Luttik, J. (2000). The value of trees, water and open space as reflected by house prices in the Netherlands. *Landscape and Urban Planning*, 48(3–4), 161–167. [https://doi.org/10.1016/S0169-2046\(00\)00039-6](https://doi.org/10.1016/S0169-2046(00)00039-6)
- Oldenberg, R. . I. S. T. & M. C. (Eds.), U. design reader. (2007). *The character of third places* (In S. Tiesdell & M. Carmona (Eds.) Urban design reader, Ed.). Architectural Place.
- Pramono, R. A. P., & Dwita Hadi Rahmi. (2021). Tolerance of Public Open Space Utilization of Urban Kampung in Surakarta City. *Built Environment Studies*, 2(1), 12–19. <https://doi.org/10.22146/best.v2i1.944>
- Safeyah, M., Mutia, F., & Susanti, W. D. (2021). *Perceiving Coastal Spatial Expression*. <https://doi.org/10.2991/assehr.k.211228.068>
- Setiawan, B., Oblo, D., & Djati, R. (2010). *Kampung Kota dan Kota Kampung Potret: Tujuh Kampung Kota di Jogja (Urban Kampung and Kampung Urban: Portrait of Seven Urban Kampung in Jogja)*.
- Shashua-Bar, L., & Hoffman, M. E. (2000). Vegetation as a climatic component in the design of an urban street. *Energy and Buildings*, 31(3), 221–235. [https://doi.org/10.1016/S0378-7788\(99\)00018-3](https://doi.org/10.1016/S0378-7788(99)00018-3)
- Siahaan, J. (2010). Ruang Publik: Antara Harapan dan Kenyataan. *Buletin Tata Ruang*, 11–16.
- Sriadi, S., Y.S., V. P., & Nurisnaeny, P. S. (2022). KAMPUNG BAHARI NUSANTARA AS AN ALTERNATIVE FOR MULTI-SECTOR DEVELOPMENT OF A VILLAGE. *International Review of Humanities Studies*, 7(2). <https://doi.org/10.7454/irhs.v7i2.454>
- UN-Habitat. (2015). *Global public space toolkit: From global principles to local policies and practice*. United Nations Human Settlements Programme (UN-Habitat).
- Vaiou, D., & Kalandides, A. (2009). Cities of “others” : public space and everyday practices. *Geographica Helvetica*, 64(1), 11–20. <https://doi.org/10.5194/gh-64-11-2009>
- Whitford, V. (2001). “City form and natural process”—indicators for the ecological performance of urban areas and their application to Merseyside, UK. *Landscape and Urban Planning*, 57(2), 91–103. [https://doi.org/10.1016/S0169-2046\(01\)00192-X](https://doi.org/10.1016/S0169-2046(01)00192-X)