The utilization pattern of east flood canal as public open space in urban area

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Abstract. East Flood Canal is one of the manmade waterfront public open spaces in Jakarta which is often visited by residents. The existence of the public open space is very important for society. The purpose of the study is to identify the utilization pattern of public open space on canal banks and analyze the problems related to the utilization of this space. Method used place centered mapping to identify physical characteristic of public open space and patterns of activity that occur in the study area. The study is conducted in the segment East Flood Canal on Jl. Kolonel Sugiono, Duren Sawit sub-district, East Jakarta. The result is the pattern of utilizing public open space in the four zones in the East Flood Canal segment is linear because the pattern follows the physical setting of pedestrian circulation paths and bicycle lanes. This study suggests both two circulation pathways (pedestrian and bicycle) need to be designed continuously along the canal and equipped with adequate facilities. Improvement of the planning, design, and maintenance of public open space in the segment of canal will have many benefits to increase social interaction, recreational activities, educational communication, and also a concern for the hydrological aspects of the canal.

1. Introduction
Public open space (POS) has an important role in urban development in cities. Planning and designing diverse and well-maintained this space will contribute to the quality of life in cities. The diversity of spatial arrangements opens up the possibility of multiple uses of it. The more diverse the arrangements, functions, and activities of this space, the greater opportunities there will be for a variety of uses and activities in the city. The role of public space in balanced urban development is therefore to support improvements in the quality of life, to enable social contact, and to maintain or re-establish cultural diversity and local identity [1]. As a waterfront city, Jakarta has many potential waterfront areas such as rivers, canals, lakes, harbors, and sea to be waterfront open spaces. The linear and boundary features of waterfront spaces provide a broad view of the water for displaying urban landscapes, which can enhance the accessibility and intimacy between people and nature [2]. Along with rivers and harbors, canals have become important sites of waterfront development. Canals represent an opportunity to instill water-driven place-based development and create districts for leisure and recreation centered on dense, walkable environments as well as on economic growth and environmental stewardship [3]. Waterfront development on canal banks will encourage walkable pedestrian activity [4].
East Flood Canal Jakarta, one of two flood canals in Jakarta was built to control the water volume and divert floods from rivers (Ciliwung River, Cipinang River, Sunter River, Buaran River, Jati Kramat) into the sea. The 23.6 km length of canal flows from East Jakarta to North Jakarta. By the time it was being constructed the land which should have been allocated to the canal, 70% had dominated by settlement areas [5]. Since the launch of the public open space of East Flood Canal by the government of DKI Jakarta at the end of 2012, the area has been visited by many people, giving rise to the emergence of various activities in that area [6]. To analyze the performance of the existing public open space, it is necessary to make a utilization pattern map which has not been created in previous research. The study aims to identify the physical characteristic and utilization pattern of public open space in canal banks and analyze the problems related to public open space utilization patterns in East Flood Canal Jakarta.

2. Methods
The study was conducted in an inductive approach as well as a qualitative method. Data is collected by observing methods. The observation method is used place-centered mapping to find out patterns of activity that occur in the study area. The utilization pattern of public open space on East Flood Canal will be explored by observation and utilization map as the result. The study area took place in segment East Flood Canal which is located in on Jl. Kolonel Sugiono, Duren Sawit sub-district, East Jakarta. To make easier the description of the existing public open spaces (POS), the segment of East Flood Canal will be divided into 4 zones (Figure 1). The basis to determine the utilization pattern of POS is done by the following steps: 1) Explored and identified the existing physical condition of the open space, 2) identified user’s activities in open space areas, 3) analysis to determine the pattern use of POS utilization and 4) analyze the problems related to POS utilization patterns in East Flood Canal.

3. Results and discussion
The segment East Flood Canal stretches about 1,4 km along Jl. Kolonel Sugiono. The canal is bordered by two inspection roads in the north and south embankment. The north inspection road is utilized to be a pedestrian path and bike path (Figure 2). Due to the different width of banks, there are many trees on the north banks than in the south. The trees species such as *Eucalyptus regnans*, *Cerbera manghas*,

![Figure 1. Research area.](image-url)
Swietenia macrophylla, Pterocarpus indicusis and Terminalia mantaly are planted along the embankment and pedestrian path and bike path. The factors that form public open spaces (POS) on the canal banks are pedestrian paths, bicycle path, passive parks in the form of sitting areas and active parks in the form of children's playgrounds.

3.1. Zone I
In this zone, there is a park as a sitting area that has a view orientation towards the canal and circulation paths for pedestrians and bicycles. The pedestrian and bicycle paths are asphalt material and separated by road markings. The path is shaded by trees on the left and right (Figure 3). The physical element of the park is a chair made of concrete. The sitting area is still under construction because the cantilevered part of the canal has not been covered with concrete pavement (Figure 4). Activities that occur within the zone are walking, running/jogging, cycling, and leisurely sitting. The pattern of space utilization formed in Zone 1 is linear because the pattern tends to follow the physical setting and the existing physical setting follows the existing circulation path.

Figure 2. Spatial form of public open space (POS) in study area.
Figure 3. Circulation paths for pedestrians and bicycles.

Figure 4. A park as a sitting area that has a view orientation towards the canal.

3.2. Zone 2
Almost all visitors in zone 2 spend time with leisurely walking, jogging, and cycling activities on the pedestrian and bicycle paths. Only a few of the visitors take advantage of the sitting area in the middle of this zone. The pattern of space utilization formed in Zone 2 is linear because the pattern tends to follow the physical setting and the existing physical setting follows the existing circulation path.

3.3. Zone 3
Similar to Zone 2, zone 3 consists of walking paths, bicycle lanes, and simple sitting areas. The activities carried out in this zone are walking, jogging, and cycling. The pattern of space utilization formed in Zone 1 is linear because the pattern tends to follow the physical setting and the existing physical setting follows the existing circulation path.

3.4. Zone 4
Zone 4 is the zone that has the most activity variations than the other 3 zones in this KBT segment (Figure 6). Apart from the pedestrian and bicycle paths like the previous 3 zones, zone 4 has a public open space in the form of a children's playground. Taman UT Aheme is a focal point for POS in this zone (Figure 5). The physical elements of this park are several children's play facilities such as swings, slides, seesaw, and wooden park benches. Activities that occur in this zone are walking, jogging, cycling, playing in the playground, and sitting leisurely. There is an activity of street vendors who use park benches to sell and peddlers of horse riding services. The pattern of space utilization formed in Zone 4 is linear because the pattern tends to follow the physical setting and the existing physical setting follows the existing circulation path.

Figure 5. UT aheme park.
Public open space on the banks of East Flood Canal, is a linear waterfront space which stretched along the canal. The attractive design of this type of open space has a high significance as a recreational trail that meet the continuity requirement of the recreational trail system and enhance the livability of the city [7]. Visitors carry out various kinds of recreational activities such as sports, walking, cycling, and playing in children's playgrounds here.

The pattern of public open space utilization is formed from elements of pedestrian paths and bicycle paths that run along the canal segment, giving visitors the experience of enjoying the canal landscape while walking, running, and cycling. However, the presence of concrete barriers and iron bars at each road node of each zone in the canal segment causes inconvenience for running, walking, and cycling (Figure 7). Number of intersections and trail design of bicycle path influence the continuity, while isolation from motorized lanes decides safety of cycling. The public open spaces should have the main factors that affect walkability and cycling activities such as continuity, comfort, safety, security, interest, convenience, attractiveness, and system coherence [7-9]. Public open spaces on the canal banks not only need equipped with adequate facilities such as parking areas, street vendor area, toilets, and proper trash bins but also need strengthening the identity design of elements, especially in pedestrian paths, bicycle paths, and parks. Improve aesthetics and characteristics of the locality of the canal segment in Duren Sawit Sub-district can be applied by enhancing local characteristic identity to such as local vegetation, monument, and the bridge design as a landmark of the area.

Public open space is always coherent with green open space because both of these spaces have ecological functions [10]. Vegetation in the public open space canal segment plays an important role in the absorption of rainwater, absorption of air pollution, and maintain climate comfort. These spaces also have an important role to protect the hydrological aspects of the city. Green open space along canal is expected to contribute to improving water quality, preventing flooding, reducing air pollution, and

Figure 6. Comparison of activity intensity in 4 zones.
supporting micro-climate regulation (Figure 8). To accommodate this ecological function, green open space must have a proper proportion. It will be optimal if it is between 50% to 80% of the area is the dominance of green space [10]. Active participation in all elements of the city (government, community, private sector, etc.) are needed for enhancing the quality of the public open space in KBT at a time it is an opportunity to promote environmental education communication to residents and visitors.

**Figure 7.** Concrete barriers and iron bars at intersection of zones. **Figure 8.** The importance of vegetation in hydrological aspects of canal.

### 4. Conclusion

The pattern of utilizing public open space in the four zones in the East Flood Canal segment is linear because the pattern follows the physical setting of pedestrian circulation paths and bicycle lanes. This study suggests both two circulation pathways (pedestrian and bicycle) need to be designed continuously along the canal and equipped with adequate facilities. Improvement of the planning, design, and maintenance of public open space in the segment of canal will have many benefits to increase social interaction, recreational activities, educational communication, and also a concern for the hydrological aspects of the canal.

### References

[1] Nared P V and Lamovšek A Z 2015 Public Open Space as a Contribution to Urban Development in Small Slovenian Cities *Urbani Izziv* 26

[2] Gong M, Ren M, Dai Q and Luo X 2019 Aging-Suitability of Urban Waterfront Open Spaces in Gongchen Bridge Section of the Grand Canal *Sustainability* 11

[3] Ellin N 2010 Canalscape: Practicing Integral Urbanism in Metropolitan *Phoenix Journal of Urban Design* 15(4) 599–610

[4] Ellin N 2009 Canalscape *Canalscape* edited by N. Ellin, 3–5 (Tempe: ASU)

[5] Simanjuntak I, Frantzeskaki N, and Enserink B 2012 Evaluating Jakarta’s flood defence governance: the impact of political and institutional reforms *Water Policy* 14(2012) 561–580

[6] Septa H and Sumabrata J 2018 Study of recreational function quality of public green open space around Jakarta’s East Flood Canal *Competition and Cooperation in Social and Political Sciences* – Adi & Achwan (Eds) 323-331 (London: Taylor & Francis Group)

[7] Yang Y 2017 The Practice And Exploration Of Shanghai Recreational Trail System Planning *Procedia Engineering* 198(2017) 127–138

[8] Khisty C J 1994 *Evaluation of Pedestrian Facilities: Beyond the Level-of-Service Concept* (Washington, DC, USA: Transportation Research Board)

[9] Khaled S 2019 Assessing Sidewalk and Corridor Walkability in Developing Countries *Sustainability* 11 3865

[10] Ernawati R 2015 Optimalisasi Fungsi Ekologis Ruang Terbuka Hijau Publik di Kota Surabaya *EMARA Indonesian Journal of Architecture* 1(2)