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Exploitation of Riverbanks as a Temporary Space for the Production of Social Space Based on Urban Public Space Needs

S. Wardiningsih[1], S.I. Wahyudi, H.P. Adi[2], Agung W. Biantoro[3], P.T. Putra[4]

[1]Department of Architecture, National Institute of Science and Technology, Jakarta, Indonesia

[2]Department of Civil Engineering, Sultan Agung Islamic University, Semarang, Indonesia

[3]Department of Civil Engineering, Universitas Mercu Buana, Jakarta, Indonesia

[4]Department of Architecture Landscape, National Institute of Science and Technology, Jakarta, Indonesia

ABSTRACT: Public space is formed through social processes or the production of space, which develops over time as a result of these processes. Social space is created within a specific temporal structure. The exploitation of the East Flood Canal riverbank functions as a public space based on its role as a temporary social space. The purpose of this research is to analyze the riverbank as a public space-based spatial layout and to identify the factors that influence its use as a temporary social space. The methods employed include descriptive evaluation and a literature review of related research results. Spatial analysis is conducted using the Analytical Hierarchy Process (AHP) method, which involves an analysis of objectives, followed by factor levels, criteria, sub-criteria, and alternative levels. The final results of this research are influenced by three main factors: the spatial layout and its shaping elements, the users and economic actors, and the networks that connect and create ties between social actors, both individuals and community groups.

KEYWORDS: Availability of water, Geoelectric, Epanet, Sensors, Dual reservoir.

I. INTRODUCTION

Public spaces are formed through social processes or the production of spaces that develop over time as a result of these processes. The need for public open spaces is currently very urgent, especially in big cities like Jakarta. As the nation's capital, Jakarta is expected to serve as an example for other cities in Indonesia. The rapid growth of the city, coupled with an increasing population and the expansion of settlements requiring land, has significantly reduced the availability of open spaces. These spaces are increasingly being replaced by commercial and non-commercial buildings [1].

The existence of riverbanks and canals presents an opportunity for these areas to be utilized as public spaces with a social function. These spaces play a significant role in fostering a vibrant atmosphere and enhancing community interaction [2]. The exploitation of the riverbanks along the East Flood Canal serves as an effort to protect the river while also supporting local government regulations. This initiative aligns with the decision of the Minister of Agrarian Affairs and Spatial Planning, as outlined in Regulation Number 14 of 2022 concerning the provision and utilization of Green Open Space. Local governments face challenges in meeting the requirement of allocating 20% of the city or urban area's land for public green open spaces. As a result, innovative solutions, such as utilizing canal banks, are essential to meet these needs.

To implement such initiatives, it is necessary to adhere to the provisions of Articles 21 and 22 of Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning. This regulation provides a framework for the provision and utilization of Green Open Space [3].

The exploitation of riverbanks in Jakarta, particularly in East Jakarta, cannot rely solely on physical infrastructure development. It must also consider environmental development that accommodates social space aspects, which are essential to prevent conflicts and reduce social inequalities within the community. Such an approach encourages the growth of social cohesion and promotes a shared awareness of the importance of maintaining the sustainability of ecological systems and river ecosystems [4].

The Duren Sawit Subdistrict (a district in East Jakarta, Indonesia) is currently preparing to transform the East Flood Canal area into a tourist destination. Although it is already being utilized by the local and surrounding communities, further efforts are needed to enhance its potential.

The purpose of this research is to analyze the exploitation of canal bank land for social space in accordance with criteria and alternatives that can accommodate the activities of the surrounding community, fulfilling the need for social spaces in urban areas [5]. The development plan for the East Flood Canal area as a recreational location and destination is focused on Duren Sawit Village, Duren Sawit Subdistrict. The East Flood Canal bank area has significant potential to

be developed as a recreation and tourism area, offering several aspects of circulation and accessibility that can create a new and enhanced atmosphere. This development allows users to engage in recreational and physical activities, such as exercise [6].

However, the presence of economic actors, particularly hawkers who are not formally involved in the area's development, often causes disturbances as they utilize the space to sell their wares. For this reason, zoning or grouping of activities will be implemented during the development process to ensure that all stakeholders in the area feel safe and that optimal results are achieved [7].

1. LITERATURE REVIEW

Public open space can be defined as a medium for social life, providing a place for people to gather and equipped with facilities to support social interactions. [8] Open spaces are defined as areas that serve as containers for human activities, both individually and in groups, as well as habitats for other living creatures to thrive and develop sustainably (Regulation of the Minister of Public Works No. 24/1992). These spaces are environments without physical covers that accommodate human activities [9].

The functions of open spaces include serving as active playgrounds for children and adults, passive relaxation areas for adults, and green environmental conservation areas. Open spaces based on their function as green open spaces can take the form of parks, athletic fields, and playgrounds [10].

Canals are waterways constructed by humans for various purposes, often forming part of river flows that have been widened and deepened in specific areas [11]. In Jakarta, canals function as critical components of the city's flood control system. Jakarta has 13 rivers, including Cipinang River, Sunter River, Buaran River, Kramat Jati River, and Cakung River, which collectively manage the water flow throughout the city [12].

The objectives of this research, based on the existing challenges, are as follows: to determine the exploitation of East Flood Canal land through strategic land-use planning that aligns with its function and to develop appropriate land exploitation strategies. To achieve these objectives, survey methods are employed, including physical identification and user activity analysis, to determine the characteristics of this area. The research location is depicted in Figure 1.

This study uses a mixed-methodology approach that combines qualitative and quantitative methods. While the approach is subjective in nature, it incorporates quantitative data to ensure accuracy. The analysis method prioritizes a hierarchical structure, requiring the creation of a hierarchy tree to analyze criteria and alternatives. This analysis is based on the results of the questionnaire.

Figure 1. Site Location

II. RESEARCH METHOD

The analysis method uses the Analytical Hierarchy Process (AHP) with questionnaires distributed to experts in their respective fields, including architects, academics, urban planners, and professionals. This research focuses on the East Flood Canal Flood Plain, examining land characteristics such as bicycle path activity areas, playground areas, sports areas, and multipurpose areas.

The four criteria and alternatives share similarities in land characteristics, including social, cultural, and economic aspects, which necessitate further research due to their strategic position in the vicinity. These areas are identified as strategic recreation zones for residents of the neighborhood and surrounding areas. Various potential recreational activities can be developed here, providing positive social, cultural, and economic value to the community.

The AHP method involves analyzing criteria and alternatives, with the land divided into four parts (Area A, Area B, Area C, and Area D) to facilitate easier analysis. The research area's division is illustrated in Figure 2.

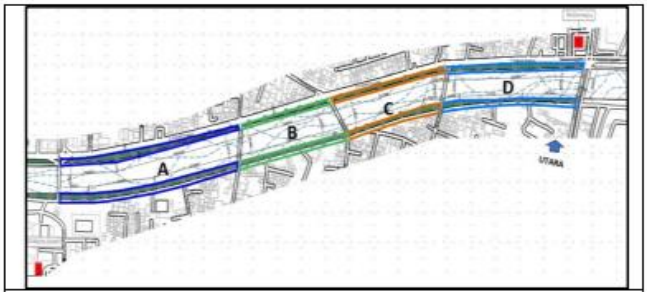

Figure 2. Location Zona Area

III. RESULT AND DISCUSSION

The results of this analysis are obtained by distributing AHP-based questionnaires to determine the criteria and alternatives, as shown in the diagram in Figure 3. The process of synthesizing priorities involves comparing alternatives using pairwise comparisons, with the initial step of calculating priority evaluation weights. Weighting is carried out in the following steps:

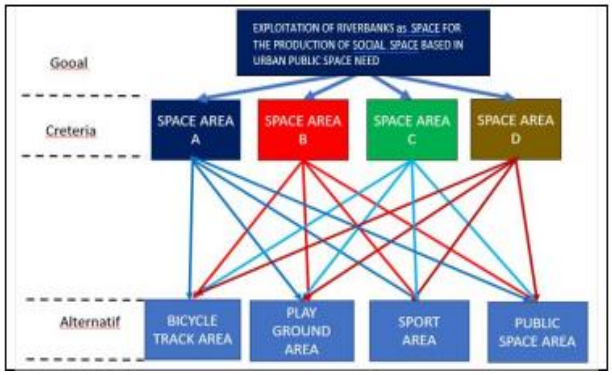

Figure 3. AHP Tree Structure

1. The factor values in Table 1 are obtained using a scale of 1 to 9 based on questionnaire responses.

Table 1. Rating scale criteria of 1 to 9

Criteria	Space Area A	Space Area B	Space Area C	Space Area D
Space Area A	1.0000	7.0000	7.0000	7.0000
Space Area B	0.1429	1.0000	5.0000	7.0000
Space Area C	0.1429	0.2000	1.0000	5.0000
Space Area D	0.1429	0.1429	0.2000	1.0000

*Analysis results

2. Divide each factor value in the column by the sum of the calculated values in each column; to get the sum Table 2 recaps all respondents and generates the Consistency Ratio. Table 2.

Table 2. Recap of Ratio Consistent

Value	Eigen			Total	Average
0.7599	0.9191	0.3748	0.3715	0.0929	0.023
0.0553	0.0069	0.5604	0.3073	0.9300	0.232
0.1181	0.9260	0.0582	0.2886	1.0228	0.256
0.0667	0.0071	0.0066	0.0326	0.1130	0.028

*Analysis results

$$CI = \frac{\lambda\, Max - n}{n-1} \qquad (1)$$

$$= 3.443033299$$
$$CI = 0.00926778$$
$$IR = 0.90\ (Tabel)\ CR = CI/IR$$
$$CR = 0.01 \leq 0.1$$

3. Find the average row value by calculating the factor value in each row.

The calculation of criteria comparisons is performed using a matrix table in Excel. This process determines which criteria among Areas A, B, C, and D are the most competent in terms of value. The detailed steps and results of this calculation are included in Table 2.

Table 3. Alternative Comparison Results with Criteria A

Space Area A	Bicycle Track (Area)	Play Ground (Area)	Sports Complex (Area)	Public Space (Area)
Bicycle Track	1.0000	10.4674	11.4203	10.2470
Playground	0.0955	1.0000	8.8466	9.2592
Sports Complex	0.0876	0.1130	1.0000	9.1469
Public Space Area	0.1130	0.1429	0.1093	1.0000
Total	**1.2961**	**11.7233**	**21.3762**	**29.6530**

Value	**Eigen**			**Total**	**Average**
0.7715	0.8929	0.5343	0.3456	2.5442	0.6361
0.0737	0.0853	0.4139	0.3123	0.8851	0.2213
0.0676	0.0096	0.0468	0.3085	0.4324	0.1081
0.0872	0.0122	0.0051	0.0337	2.4603	0.6151

$$CI = \frac{\lambda\, Max - n}{n-1} \qquad (2)$$

$$= 23.9682$$
$$CI = 0.006651$$
$$IR = 0.90\ (Tabel)\ CR = CI/IR$$
$$CR = 0.007 \leq 0.1$$

From the criteria table, the Consistency Ratio (CR) is 0.007, which is smaller than 0.1, indicating consistency. Recap of Questionnaire Results Comparison of Assessment Levels between Alternatives and Criteria: Which is more important? Assessment Level: Space areas A, B, C, and D with alternatives; Bicycle track; Playground, active sports area; Public space. All criteria are compared with alternatives for all space areas with alternatives to get the priority of utilization. The results of the questionnaire with the experts are tabulated to get the average priority value presented in Tables 3, 4, 5, and 6. The results of the comparison of criteria and alternatives are as follows:

Table 4. Comparison of Alternatives with Criteria B

Space Area B	Bicycle Track	Playground	Sports Complex	Public Space Area
Bicycle Track	1.0000	7.5601	6.9425	8.1329
Playground	0.1323	1.0000	5.3481	9.8596
Sports Complex	6.9425	0.1440	1.0000	8.6603
Public Space Area	0.1230	0.1014	0.1155	1.0000
Total	**8.1977**	**8.8055**	**13.4060**	**27.6527**

Value	Eigen			Total	Average
0.1220	0.8586	0.5179	0.2941	1.7925	0.448

0.0161	0.1136	0.3989	0.3565	0.885	0.221
0.8469	0.0164	0.0746	0.3132	2.6777	0.669
0.0150	0.0115	0.0086	0.0362	0.0713	0.018

$$CI = \frac{\lambda\, Max - n}{n-1} \quad (3)$$

$$\lambda = 3.696479$$

$$CI = 0.015\ (IR - 0.90).\ CR = CI/IR = 0.002 < 0.01$$

From the criteria table, the Consistency Ratio (CR) is 0.007 < smaller than 0.1 is consistent. Table 4 Comparison of Alternatives with Criterion B

Table 5. Comparison of Alternatives with Criteria C

Space Area C	Bicycle Track	Playground	Sports Complex	Public Space Area
Bicycle Track	1.0000	12.1244	13.2280	10.4674
Area Play Ground	0.0825	1.0000	10.4674	1.9788
Sports Complex	0.0756	0.2000	1.0000	8.4090
Public Space Area	0.2000	0.5054	0.1189	1.0000
Total	1.3581	13.8297	24.8144	21.8552

Value		Eigen		Total	Average
0.1220	0.8586	0.5179	0.2941	1.7925	0.448
0.0161	0.1136	0.3989	0.3565	0.885	0.221
0.8469	0.0164	0.0746	0.3132	2.6777	0.669
0.0150	0.0115	0.0086	0.0362	0.0713	0.018

$$CI = \frac{\lambda\, Max - n}{n-1} \quad (4)$$

$$\lambda = 0.2469178$$

$$CI = 0.0065973$$

$$CR = CI/IR\ (IR = 0.90\ Tabel)$$

$$CR = 0.006597$$

$$CR = 0.07 < 0.1$$

From the criteria table, the Consistency Ratio (CR) is 0.07 < smaller than 0.1 is consistent.

Table 6. Comparison of Alternatives and Criteria D

Space Area D	Bicycle Track	Playground	Sports Complex	Public Space Area
Bicycle Track	1.0000	14.2144	14.2144	13.3488
Playground	0.1429	1.0000	11.7725	13.0126
Sports Complex	0.0704	0.0849	1.0000	11.1902
Public Space Area	0.0749	0.0768	0.0768	1.0000
Total	**1.2881**	**15.3762**	**27.0638**	**38.5516**

Value		Eigen		Total	Average
0.776324	0.924442	0.525218	0.346258	2.5722	0.643
0.110904	0.065036	0.434992	0.337538	0.9485	0.237
0.054615	0.005524	0.036950	0.290265	0.3874	0.097
0.058157	0.004998	0.002840	0.025939	0.0919	0.023
					1

$$CI = \frac{\lambda\, Max - n}{n-1} \quad (5)$$

$$\lambda = 7.9811$$

$$CI = 0.0013\ (IR - 0.90)$$

$$CR = CI/IR$$

$$CR = 0.001 < 0.1$$

From the criteria table, the Consistency Ratio (CR) is 0.001 < smaller than 0.1 is consistent.

The results of all these comparisons will be used to rank the alternative facilities, so the ranking of each of the land calculations on the social space occurrence process is generated:

The process of social space is produced: The results of the area and alternative scorings can determine the allocation of area requirements for activities in this area, as follows in Table 7.

Table 7. Area ranking results

No	Area	Function	Scoring	%
1	A	Public Space	0.40032	40
2	B	Play Ground	0.20675	20
3	C	Sports Complex	0.30873	30
4	D	Bicycle Track	0.10538	10

It can be concluded that the exploitation of the banks in:

Area A: A public space that requires the most land area. In this space, all temporary activities, such as bazaars, painting, and activities requiring protection, comfort, and security, can be accommodated and initiated.

Area B: A playground area, which is a requirement for public open space and is intended for children aged 0 to 12 years. This area functions as an educational area for learning while playing.

Area C: An area equipped with bicycle, jogging, and pedestrian tracking facilities. It features a road width of 5 meters, marked with strict signage for security purposes.
Area D: A multi-purpose sports area. This open and spacious space can be used for activities such as gymnastics and kite flying, which require a large area. It also includes areas for sitting and resting for users who are exercising. The existing activity zoning plan in the East Flood Canal bank area is presented in the site zoning drawing in Figure 4.

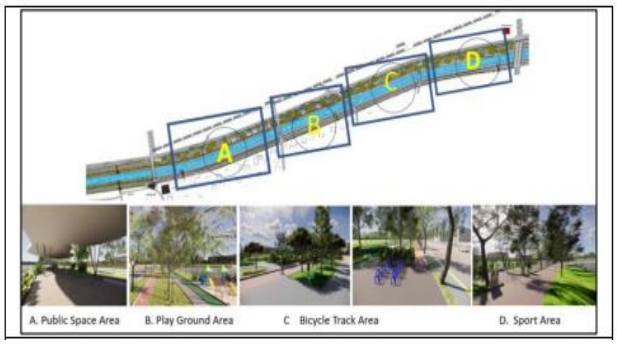

Figure 4. Site Plan Riverbank Banjir Kanal Timur

IV. CONCLUSIONS

Based on the above discussion about the statements described, the riverbank will exploit the land with a recreation category as open space land for certain activities or functional needs, requiring further research to ensure sustainability. Facilities and infrastructure in this area include amenities supporting activities such as bicycle paths, playgrounds, open sports areas, and function rooms utilized for various activities. There are also pedestrian pathways and green areas surrounding it. Accessibility can be improved at each entry point to the location to enhance the experience of enjoying the atmosphere along the canal banks. Additionally, incorporating various types of vegetation can enhance the aesthetics of this area.

REFERENCES

1. Alifia, N., & Purnomo, Y. (2016). Identification of Location and Type of Green Open Space in Urban Settlement Urban Settlements. Langkau Betang: Journal of Architecture, 3(2), 2538.Identifikasi Langkau Betang: Jurnal Arsitektur, 3(2), 25–38. https://doi.org/10.26418/lantang.v3i2.18329
2. Boyé, H., & Vivo, M. (2016). The environmental and social acceptability of dams. In … Actions Science Reports. The journal of …. journals.openedition.org. https://journals.openedition.org/factsreports/4055
3. [3] Br. Gultom, B. J., & Caesariadi, T. W. (2018). Persepsi Masyarakat Tepian Sungai Terhadap Pemanfaatan Ruang Sirkulasi Dan Ruang Terbuka Sebagai Respon Mitigasi Bencana Berbasis Bencana Air Di Sintang. Langkau Betang: Jurnal Arsitektur, 5(2), 97. https://doi.org/10.26418/lantang.v5i2.29889
4. Farisi, S. Al, Ramdlani, S., & Haripradianto, T. (2017). Pengoptimalan Fungsi Ruang Terbuka Hijau Pada Komplek Hutan Kota Velodrom Sawojajar. Jurnal Mahasiswa Jurusan Arsitektur Universitas Brawijaya,5(2).
5. Hadinata, I. Y., & Mucamad, B. N. (2018). Studi penyusunan dan Penentuan Sempadan Sungai di Kota Banjarmasin. URNAL Kebijakan Pembangunan, 13(1), 1–7. file:///C:/Users/user/Downloads/86-Article Text-556-1-10-20200224.pdf
6. Handy, M. R. N., Mutiani, M., Putra, M. A. H., Syaharuddin, S., & Putro, H. P. N. (2021). Adaptation of Riverbanks Community to Urban Green Open Space Development. The Innovation of Social Studies Journal, 2(2), 127. https://doi.org/10.20527/iis.v2i2.3074
7. Huda, K. (2017). Pengaruh Kualitas Fisik Ruang Terbuka Publik Aktif Perkotaan terhadap Kualitas 8Hidup Masyarakat. A023–A030. https://doi.org/10.32315/ti.6.a023
8. Prakoso, P., & Herdiansyah, H. (2019). Analisis Implementasi 30% Ruang Terbuka Hijau (Analysis of 30% Green Open Space Implementation in DKI Jakarta). Majalah Ilmiah Globe, 21(01- 04–2019), 17–26.
9. Rahmiati, D. (2017). Kajian Elemen Pembentuk Ruang Kota pada Ruang Terbuka Publik Kota (Studi Kasus : Alun-alun Karanganyar). Ikraith Teknologi, 1(2), 1–8.
10. Reza Maulana, A. F., & Sulistyarso, H. (2020). Strategi Optimalisasi Ruang Terbuka Hijau Publik Berdasarkan Preferensi Masyarakat di Kecamatan Jambangan, Surabaya. Jurnal Teknik ITS, 8 (2). https://doi.org/10.12962/j23373539.v8i2.47543\
11. Shalih, Osmar. Khaerunnisa, Mila Safrizal, A. (2017). ANALYSIS OF CANAL FLOOD FUNCTION EAST: In Uvercoming Flooding in the Easten Region of DKI Jakarta. Acit, 67(6), 14–21. https://doi.org/10.31227/osf.io/j8awk
12. Ugrasena, R. S., Siwalatri, N. K. A., & Prajnawrdhi, T. (2020). Utilization Oprn Space Public Open Space Utilization in Berawa Coastal Area. RUANG-SPACE, Jurnal Lingkungan Binaan (Space :Journal of the Built Environment), 7(2), 187. https://doi.org/10.24843/jrs.2020.v07.i02.p06.