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MORALITY BEFORE KNOWLEDGE

Green open space planning based on spatial justice in Jakarta: Study of child friendly integrated public spaces/RPTRA and general green open space

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ABSTRACT

Background: Urbanization has significantly reduced green open spaces in Jakarta, impacting ecological balance and quality of life. While the importance of green open spaces for urban quality of life is well understood, comprehensive studies on spatial justice related to the distribution and accessibility of green open spaces in major cities like Jakarta are still limited. This study aims to assess the distribution, accessibility, and government budget allocation for public green open spaces in South Jakarta, with a focus on spatial justice and equitable access. **Method:** Using GIS software, this study assesses the distribution and accessibility of urban green spaces, conducts descriptive analysis on government budget allocation, and evaluates justice in public green space planning in South Jakarta. **Findings:** Despite the overall availability of green open space in South Jakarta meeting the standard of 0.2 m^2/capita, the sub-districts of Pasar Minggu and Pesanggrahan still exhibit gaps in availability, and accessibility uneven trough all South Jakarta. **Conclusion:** Moreover, the budget allocated by the government for green spaces is relatively low compared to the total budget of DKI Jakarta. Green open space planning in the City of South Jakarta has not yet fully achieved spatial justice. This is influenced by the insufficient number, area and distribution to reach all regions and accommodate all levels of society. **Novelty/Originality of This Article:** This study highlights spatial injustice in the distribution and accessibility of green open spaces in South Jakarta using GIS analysis, revealing disparities despite meeting per capita standards and inadequate government budget allocation.

KEYWORDS: child friendly integrated public space; green open space; South Jakarta; spatial justice; urban spatial planning.

1. Introduction

By the year 2007, the distribution between urban and rural residents had equalised, representing a balanced share of the population. However, since then, the share of individuals residing in urban areas has escalated, exceeding 50% of the total population live in the cities (United Nations, 2019). This can lead to the shrinking of urban green spaces (or also known as Open Green Space) including plantations, forests, grasslands, and cultivated land (Abebe & Megento, 2016). The Green Open Space/*Ruang Terbuka Hijau* (RTH) in Jakarta has declined by 23% from 1983 to 2013, and by 2020, it covered only 4.65% (3,080.89 ha) of the province—still far from the 20% target set by Act No. 26 of 2007 (Setiowati et al., 2018).

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These green spaces provide a wide range of ecosystem services that are vital for the well-being of cities and their inhabitants. Some of these benefits are improving air condition, eliminating noise and pollutants but also can be a device to stabilise our city's ambiance. It could be used as a generator to reduce heat in a city, slow down the run-off and provide a home for our biodiversity (Kasim et al., 2019). Residing in urban areas with higher green space is associated with lower mortality risk (Bauwelinck et al., 2021).

Cities worldwide are increasingly showing a keen interest in the development and preservation of green spaces within urban environments. Green open space strategies can be paradoxical; while adding new green spaces can enhance environmental justice by improving public health and urban aesthetics, it may also raise housing costs and property values, potentially leading to gentrification and displacing the intended beneficiaries. Additionally, green open spaces are a key environmental justice concern, as low-income neighborhoods and communities of color—often facing significant public health challenges—tend to have limited access to safe and well-maintained parks and recreational areas in many cities (Wolch et al., 2014).

Spatial justice cannot be based only on social, economic and environmental issues, but rather on how to view space more critically (Soja, 2009). Spatial justice is an extension of social justice, to realise equality by involving civil society in a community or several social classes who have a share in the distribution of space (Dadashpoor et al., 2016). In addition, spatial justice is one of the objectives of urban planning, namely distributive justice in which spatial planning policies must ensure that the allocation of fair resources and development projects and city development not only benefit a handful of people and groups but also provide benefits to all levels of society such as space distribution public and reducing inequality in marginalised areas (Seto & Najicha, 2023). The distribution of city facility services basically requires a proportional concept in the application of equality, where efficiency and effectiveness are conditions for spatial balance (Dadashpoor et al., 2016).

In urban spatial planning, environmental science has a role in the planning of urban green areas which functions for recreation, aesthetics, mitigation, and nature conservation that supports the sustainability and urban resilience of threats such as climate change (Wei & Zhan, 2023). In the 1945 Constitution of the Republic of Indonesia, it is mandated that natural resources must be used as wide as possible for the prosperity of the people, where the prosperity in question can be enjoyed by every individual both in the present and future generation (Saputro, 2023). This means that each individual has the right to gain access to nature by gaining access to urban green open spaces such as parks and urban forests, as well as other green public areas including Child Friendly Integrated Public Space/*Ruang Publik Terpadu Ramah Anak* (RPTRA).

In environmental science, "space" usually refers to the area or physical area where the interaction between humans, animals, plants, and other environmental elements occurs (Wei & Zhan, 2023). The concept of space in environmental science includes an understanding of land use patterns, natural resource distribution, climate change, water and air quality, and the relationship between humans and their environment so that space functions as a framework for analysing complex interactions between humans and their environment, as well as to plan environmental management which is sustainable (Wei & Zhan, 2023). However, to the author's knowledge, studies on justice issues related to green open spaces are still limited, and so far, no such study has been conducted in a major city like Jakarta

In accordance with the Minister of Agrarian and Spatial Planning Regulation Number 14 of 2022, urban areas must allocate a minimum of 30% of the total area for Green Open Space. Of these, at least 20% must be intended for public green space and 10% for private green space (Pramesthi et al., 2023). green open spaces ownership can be classified into two categories: public green open space, which is owned and managed by the regional government for the benefit of the general public, and private green space, which is owned by certain institutions or individuals, such as gardens or yards owned by the community or private. Building, with limited access (Pramesthi et al., 2023).

In a certain area, the implementation of public green space such as city parks, urban forests, and green corridors along the roads, railroad tracks, rivers and high voltage electricity channels are planned to occupy at least 20% of the area or larger (Hidayah et al., 2021). In addition, the inclusion of private green space, which can improve the quality of the environment in a region, is also considered important. Therefore, the allocation of recreational facilities and public tourism is important to guarantee the accessibility of these facilities in an area (Hidayah et al., 2021).

SNI Document 03-1733-2044 Describe the Guidelines for Urban Housing Environment Planning. This refers to the Instructions of the Minister of Home Affairs Number 4 of 1988 which defines Green Open Space as an area that is mostly overgrown with vegetation, both naturally and intentionally planted (National Standardization Agency, 2004). These spaces have an ecological function and contribute to the welfare of urban areas. The categorization of green open space facilities in residential areas can be determined based on its ability to serve certain populations, as outlined in SNI 03-1733-2044. The specific criteria are as follows: (1) At least 1 park is required for each Neighborhood Association (RT) or a residential area with a population of 250 people, in order to provide a sense of comfort to the city, including clean air and sunlight, as well as a place for recreation for the younger generation; (2) Each Community Association (RW) or an area with a population of 2,500 people must have at least one park. These parks must function as playgrounds for children and sports fields for sports activities; (3) Parks and sports fields must be owned by every village unit (Kelurahan) or region with a population of 30,000 people to meet the needs of the activities of the population in open spaces, including sports tournaments, ceremonies, and other events; (4) Each sub-district or regional unit (Kecamatan) with a population of 120,000 people has a minimum of one open grizz which is intended as a place for sports matches (such as tennis and basketball fields), ceremonies, and other activities that require large and non-obstructed land.

Requirements for the Green Open Space Area determined based on service capacity in accordance with the population as specified in SNI 03-1733-2044, described as follows: (1) Neighborhood Association (*Rukun Tetangga/*RT) unit with an estimated population of 250 people requires a minimum area of 250 square metres; (2) Community Association (*Rukun Warga/*RW) residential units with an estimated population of 2,500 people, a minimum area of 1,250 m^2, or an average of 0.5 m^2 per population is needed; (3) for the village unit (Kelurahan) which has a population of around 30,000 people, a minimum area of 9,000 m^2 is needed, which is equivalent to a standard of 0.3 m^2 per population; (4) the sub-district (Kecamatan) unit with a population of around 120,000 people must have a minimum area of 24,000 m^2 (2.4 hectares), which is equivalent to a standard of 0.2 m^2 per person.

The spatial dimension is an integral part of social justice because city space acts as a residence for residents and influences their ability to participate in regulating the use and management of land and urban space (Seto & Najicha, 2023). Indicators that are priorities in providing spatial justice in urban areas, namely justice, choice/options, accessibility, connectivity, and participation (Rocco, 2014). Therefore, social justice in urban planning is related to the participation of actors in the planning and distribution of development impacts, as well as distribution of public facilities including green open spaces (Seto & Najicha, 2023).

Spatial justice in the arrangement of green space can be realised by fulfilling and equitable quantity and distribution of green space locations that have easy and close access to each individual (Hidayah et al., 2021). The policy regarding the provision of green open space in Indonesia has undergone transformation in stages. There are three policy methods that have an impact on technological solutions to create green open space in the planning area (Hidayah et al., 2021). First, this area has a function of protection and conservation. Furthermore, the green corridor can be built by utilising the corridor along the road network and utility. Finally, controlling building density. The allocation of protected areas can be carried out through the determination of urban forests and preservation of river buffer areas. In addition, land that experiences changes in function can be restored and converted into green open space. The second plan can be carried out by optimising the

creation of a green corridor along the highway, railroad tracks, pedestrian paths, riverbanks, water bodies, and utility networks such as high voltage electricity channels. Alternatively, the last approach involves the application of policies to control population density by setting a minimum of 20% of the Green Basic Coefficient (KDH) in the urban core area (Hidayah et al., 2021).

Open Green Space is a form of public facilities that can be utilised and accessed freely by residents of a region. In spatial planning, green space becomes an important aspect to maintain the balance of ecosystems in urban areas where it is mentioned in Law Number 26 of 2007 concerning Spatial Planning that each planning area must provide green space with a minimum area of 30% of the total area with a detail of 20% used as public green space and 10% is used for private green space (Hidayah et al., 2021). As part of green open spaces, according to DKI Jakarta Provincial Governor Regulation No. 123 of 2017 (BPK RI, 2017) concerning the Management and Needs of Facilities and Infrastructure of Child Friendly Integrated Public Spaces, the main function of the RPTRA is as a place for community interaction all ages, ranging from the womb to the age of the elderly, medium for the game and growth and development of children, and groundwater absorption (Jakarta Provincial Governor, 2017). In addition, based on the Governor Regulation of DKI Jakarta Province Number 196 of 2015 (BPK RI, 2015), the purpose of the RPTRA is to help local residents provide friendly and comfortable areas for children and the general public who live in densely populated areas (Jakarta Provincial Governor, 2015).

Based on the description above, this study aim to identify the distribution and availability of public green space locations in South Jakarta, as well as assess their accessibility from slum areas. Additionally, we will evaluate the government's budget allocation for green open spaces and assess justice in public green space planning in South Jakarta.

2. Methods

Researchers chose green spaces located in South Jakarta City. Where South Jakarta has an area of 14.127 hectares or 21,29% form DKI Jakarta Province with a population of 2.235.606 people in 2023 (DKI Jakarta Provincial Central Statistics Agency, 2024). In addition, South Jakarta City as part of a metropolitan city has a slum area of 1830,01 hectares and green open space of 84,97 hectares. Administratively, South Jakarta City is divided into 10 subdistricts and has the following boundaries. North: West Jakarta City and Central Jakarta City. East: East Jakarta City. South: Depok City, West Java Province. West: Tangerang City and South Tangerang City, Banten Province (Fig. 1).

This study uses spatial and non -spatial data with the following details: (1) Spatial Shapefile Data Sub-district administrative boundaries in Jakarta sourced from inageoportal (Geospatial untuk Negeri, n.d); (2) Spatial Shapefile Data Road and Aquatic Networks in Jakarta sourced from Inageoportal (Geospatial untuk Negeri, n.d); (3) Spatial Shapefile Data on the distribution of slums in Jakarta in 2024 sourced from the Jakarta Satu website (Jakarta Satu, 2021); (4) Spatial Shapefile Data Distribution of Green Open Space Location in Jakarta sourced from the Jakarta Satu website (Jakarta Satu, 2021); (5) Non-Spatial Data Number of Population of Jakarta in 2023 per Administrative City/District is sourced from BPS DKI Jakarta; (6) Government budget realization for green open spaces source from DKI Jakarta Province Regional Regulation Number 6 of 2023 concerning the 2024 Regional Revenue and Expenditure Budget.

Assessing the spatial justice of green spaces involves considering factors like proximity, distribution, and quality to address access inequalities (Huang et al., 2023; Kılıç & Terzi, 2022). The integration of spatial analysis techniques, such as GIS, is crucial for evaluating urban green space systems from various perspectives, including accessibility and disaster prevention (Wu et al., 2018; Zhou et al., 2022). In this study, we aim to explore the justice within urban green spaces, particularly by analysing the distribution, availability, and accessibility of green spaces within slum areas. Additionally, we seek to gain insight into

urban green space policy priorities by investigating how they are shaped and influenced by the allocation of government funds.

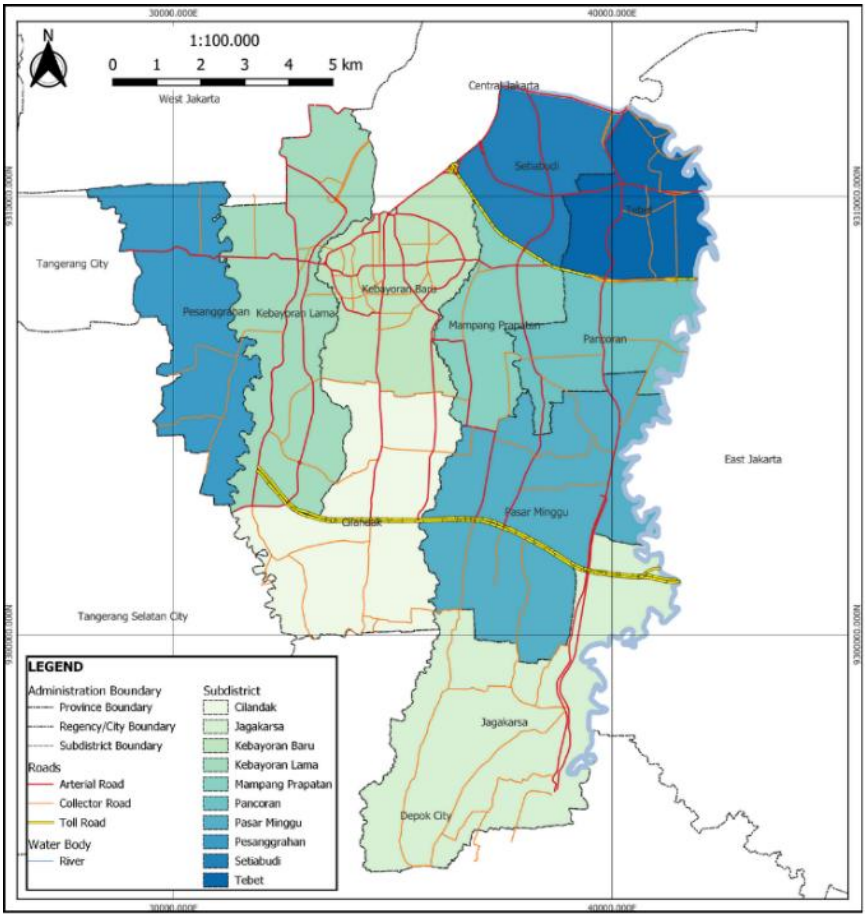


Fig. 1 Map of South Jakarta
(Badan Informasi Geospasial, 2023)

This research methodology prioritises the systematic analysis and interpretation of data to provide a clear and objective understanding of the status and dynamics of urban green spaces. The last stage of this analysis is to evaluate public Green Open Spaces in South Jakarta from the standards of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 14 of 2022 and SNI 03-1733-2004 and whether the location of Green Open Spaces is evenly distributed throughout the area and can be accessed by people living in slum areas or not. In addition, spatial justice will also be evaluated from the available public green spaces.

3. Results and Discussion

3.1 Identification of the distribution and availability of public green space locations

The green open spaces analyzed in this study are parks. These include various types such as city parks, child-friendly parks (RPTRA), parks around buildings, and others. South Jakarta has 480 parks covering a total area of 84.97 hectares, distributed across 10 districts. The distribution map of green open spaces in South Jakarta is shown in the Fig 2.

South Jakarta has Green Open Space in various areas, although the number and size vary greatly. The distribution of green open space shows a connection with the city road network (Adharina & Aulia, 2022). This includes arterial roads that carry large amounts of traffic, collector roads with moderate traffic flow, and local roads that serve smaller neighborhoods. Apart from that, there are several green open spaces in the area around the

building which have been converted into parks. When viewed from a particular district, Kebayoran Baru is an example of a clustered green open space pattern. Here, green space tends to be concentrated in the Blok M area, a central commercial area, which is surrounded by a network of arterial and collector roads. Likewise, Tebet Regency has green space centered around Tebet Ecopark, a popular city park. In contrast, other districts have a more widespread distribution of green open spaces.

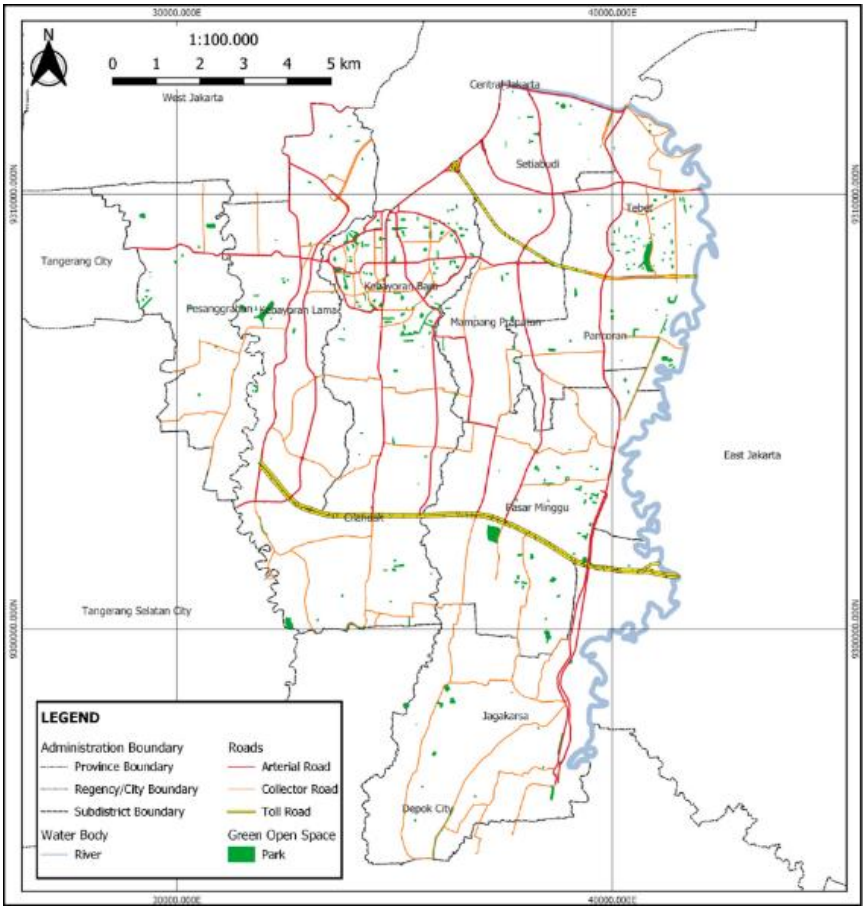


Fig 2. Map Distribution Green Open Space in South Jakarta City

This green space has many benefits for the people of South Jakarta. Residents use it for recreation, exercise, relaxing, playing with children, or just enjoying walking in nature (Ramadhan & Zahra, 2023). It is frequented by people of all ages and genders, and many people use it for solo activities or to gather in groups to socialize. The presence of green open space in the city contributes to a livelier and healthier urban environment (Sari et al., 2020). The size of the green open spaces in South Jakarta can be seen in Table 1.

Table 1. Distribution of Green Open Space Area in South Jakarta City

District	Number of Green Open Space		Green Open Space Area	
	Unit	Percentage	Ha	Percentage
Jagakarsa	36	7.50%	8.02	9.44%
Pasar Minggu	68	14.17%	18.37	21.62%
Cilandak	24	5.00%	5.59	6.58%
Pesanggrahan	23	4.79%	3.59	4.23%
Kebayoran Lama	47	9.79%	6.97	8.20%
Kebayoran Baru	165	34.38%	20.58	24.22%
Mampang Prapatan	18	3.75%	2.10	2.47%
Pancoran	32	6.67%	6.39	7.52%
Tebet	47	9.79%	11.15	13.12%
Setiabudi	20	4.17%	2.21	2.59%
South Jakarta City	480	100%	84.97	100%

Analysis of the distribution of Green Open Space in South Jakarta City (Table 1) shows that there are quite significant disparities between sub-districts. Kebayoran Baru stands out with the highest concentration, namely 165 units and covering 24.22% of the total green open space area. In contrast, Mampang Prapatan has the fewest units (18 units) and Setiabudi has the smallest total area (2.20 hectares, or only covers 2.59% of the city's total green open space). This large variation, namely a difference of 147 units and 18.38 hectares between Kebayoran Baru and the poorest district, raises concerns about equitable access to this important resource for all residents of South Jakarta.

This uneven distribution of green space can have negative impacts. Residents in areas with less green space face limitations in accessing recreation, exercise and stress reduction facilities. This can lead to environmental injustice, where certain communities are disproportionately burdened by a lack of green space and its associated benefits. Research shows that access to green space is associated with improved physical and mental health, as well as increased social interaction and community cohesion (Fuller et al., 2007). A lack of nearby green space can negatively impact residents' quality of life. Green open spaces in South Jakarta are divided into three classifications based on their area as follows (J. Zhang et al., 2021): (a) District-level with an area of 2 to 10 hectares; (b) Neighborhood-level with an area of 0.5 to 2 hectares; (c) thers with an area of less than 0.5 hectares. The distribution of green open space based on its classification can be seen in the following Fig 3.

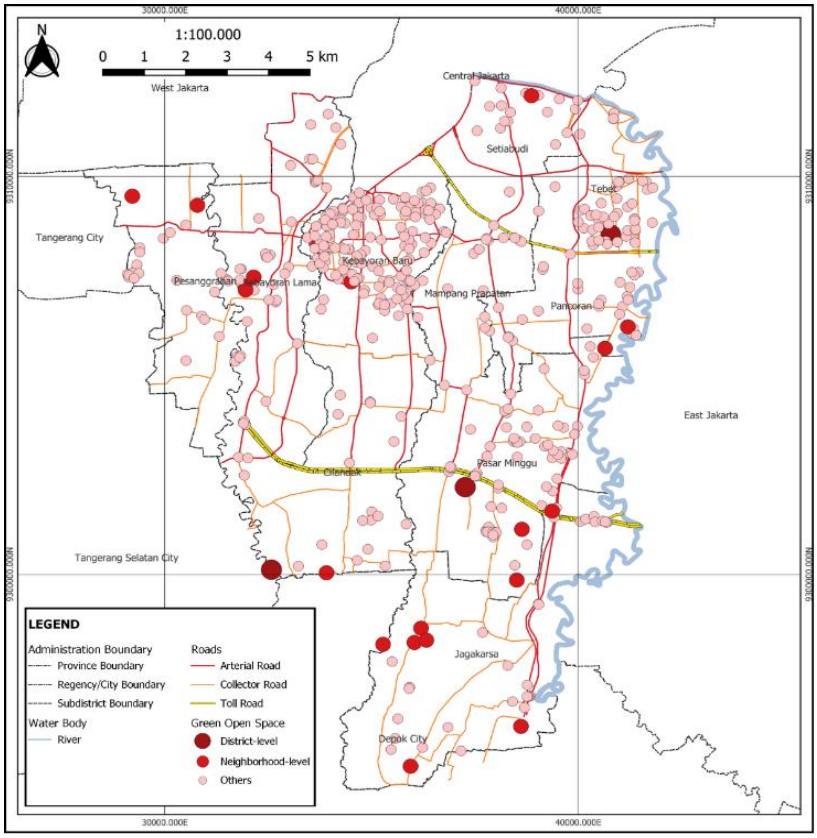


Fig. 3. Map classification of green open space in South Jakarta City

Of the three classifications, it can be seen that “the others” classification is the one that dominates, reaching 457 units or 95.21% of the total amount of green open space. This means that the majority of green open spaces in South Jakarta City have an area of less than 0.5 hectares. Apart from that, the green open space at “the neighborhood-level” classification is 20 units while the district level is only 3 units. The extent of green open space classification based on sub-districts can be seen in the following Table 2.

Pasar Minggu District and Cilandak District are districts that have open spaces with three classifications. Meanwhile, Mampang Prapatan and Tebet subdistricts only have other

classifications, which means that all their green open spaces have an area of less than 0.5 hectares. Imagine a resident of Pesanggrahan District. This area does not have green space at the neighborhood level and district level. To access larger parks suitable for activities such as team sports, jogging, or simply enjoying nature, they are forced to travel to Pasar Minggu District, Cilandak District, or Tebet District – a potentially huge challenge, especially for those who have limited transportation or housing. on the outskirts of the district. Distance itself can be a barrier, so they forget about the social, health and environmental benefits associated with green spaces (Wolch et al., 2014).

Table 2. Classification of green open space area in South Jakarta City

District	District-level		Neighborhood-level		Others	
	Unit	%	Unit	%	Unit	%
Jagakarsa	0	0	6	30.00%	30	6.56%
Pasar Minggu	1	33.33%	3	15.00%	64	14.00%
Cilandak	1	33.33%	1	5.00%	22	4.81%
Pesanggrahan	0	0	2	10.00%	21	4.60%
Kebayoran Lama	0	0	3	15.00%	44	9.63%
Kebayoran Baru	0	0	2	10.00%	163	35.67%
Mampang Prapatan	0	0	0	0.00%	18	3.94%
Pancoran	0	0	2	10.00%	30	6.56%
Tebet	1	33.33%	0	0.00%	46	10.07%
Setiabudi	0	0	1	5.00%	19	4.16%
South Jakarta City	3	100%	20	100%	457	100%

This inequality in access to green space reinforces existing social inequalities. Research shows a relationship between low socioeconomic status and limited access to quality urban facilities, including green space (Wolch et al., 2014). The lack of larger green spaces in several sub-districts in South Jakarta has a disproportionate impact on these residents. Limited access can lead to negative health impacts due to limited opportunities for exercise, stress reduction, and exposure to nature (Bithas & Christofakis, 2006). Essentially, residents in these areas are denied the opportunity to improve their physical and mental well-being – as a result of their location within the city.

Green open space is an important element in spatial planning, especially in urban areas. Green open spaces must be planned and managed well to ensure that they provide maximum benefits for the environment and society. The requirement for green open space can be determined based on land area, as regulated by Ministerial Regulation No. 14 of 2022, and population size, as specified in SNI 03-1733-2004. The calculation of green open space needs in South Jakarta is presented in the following Table 3.

Table 3. Need of green open space area in south jakarta city based on the minister of agrarian affairs and spatial planning/head of the National Land Agency of the Republic of Indonesia Number 14 of 2022

District	Area (ha)	Need of Open Green Space (20% of Total Area)	Existing Open Green Space (ha)	Gap of Need and Existing (ha)
Jagakarsa	2,487	497.40	8.02	489.38
Pasar Minggu	2,169	433.80	18.37	415.43
Cilandak	1,816	363.20	5.59	357.61
Pesanggrahan	1,276	255.20	3.59	251.61
Kebayoran Lama	1,672	334.40	6.97	327.43
Kebayoran Baru	1,293	258.60	20.58	238.02
Mampang Prapatan	773	154.60	2.1	152.50
Pancoran	853	170.60	6.39	164.21
Tebet	903	180.60	11.15	169.45
Setiabudi	885	177.00	2.21	174.79
South Jakarta City	14,127	2,825.40	84.97	2,740.43

The Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 14 of 2022 states that the minimum area of public green open space is 20% of the area (Ministry of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia, 2022). The calculation results for the need for green open space based on the area in South Jakarta City reached 2,825.40 hectares. Meanwhile, the availability of green open space is only 84.97 hectares, so there is a gap of 2,740.43 hectares. The amount of green open space in South Jakarta only reaches 3%. This shows that green open space planning has not been able to reach standards. Apart from that, the spatial planning experiences an imbalance between green open space and built-up space or does not achieve spatial justice in spatial planning. Where, this can cause environmental degradation. Therefore, the South Jakarta City government needs to make planning improvements to increase the quantity of green open space by 17% of the area. This plan should prioritize underserved sub-districts that currently lack access to greater green space. This two-pronged approach ensures a fairer distribution and allows all residents to reap the social, health and environmental benefits associated with green spaces. Various ways can be taken to achieve this, such as converting underused land into parks, promoting green roofs and pocket parks in existing urban areas, and acquiring special land for green open space development (L. Zhang et al., 2021).

Table 4. Classification green open space area in South Jakarta City based on SNI 03-1733-2004

District	Population in 2023 (people)	Need of Green Open Space (0.2 m^2/capita)	Existing Open Green Space (m^2)	Gap of Need and Existing (m^2)
Jagakarsa	383,420	76,684	80,233	0
Pasar Minggu	335,480	67,096	20,997	46,099
Cilandak	229,740	45,948	111,505	0
Pesanggrahan	272,560	54,512	22,048	32,464
Kebayoran Lama	334,460	66,892	205,808	0
Kebayoran Baru	156,270	31,254	35,931	0
Mampang Prapatan	159,610	31,922	183,708	0
Pancoran	179,930	35,986	63,877	0
Tebet	240,620	48,124	69,636	0
Setiabudi	117,300	23,460	55,922	0
South Jakarta City	2,409,390	481,878	849,667	0

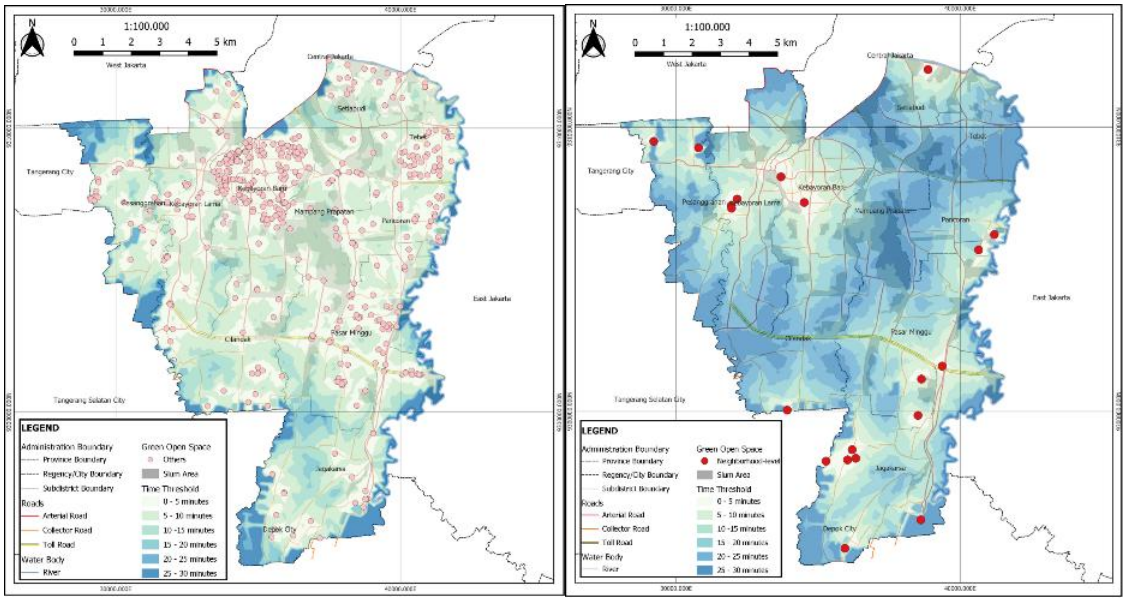
SNI 03-1733-2004 states that the standard for green open space per capita is 0,2 m^2 to ensure that every individual can access and utilize green open space. The calculation results show that the overall availability of green open space in South Jakarta has been fulfilled with no gaps. However, if we look at it based on administration, there are two sub-districts that still have a gap in green open space, namely Pasar Minggu Sub-district and Pesanggrahan Sub-district. With this gap, some people have not received their right to access green open space, or in other words, green open space planning has not achieved spatial justice for the entire community.

The calculation results show that the City of South Jakarta is still unable to provide green open space fairly and evenly for all levels of society. People who live in areas that still have gaps will find it difficult to access green open spaces. This will cause inequality between people who have the resources to access green open spaces and those who do not. With high land prices, poor people will tend to look for cheap land to live in, which is usually in slum areas. Poor people are people who do not have the resources to reach open spaces due to long distances, transportation costs, and poor residential infrastructure so that they are not well facilitated. In fact, green open space is space that is free and free to be accessed by the entire community.

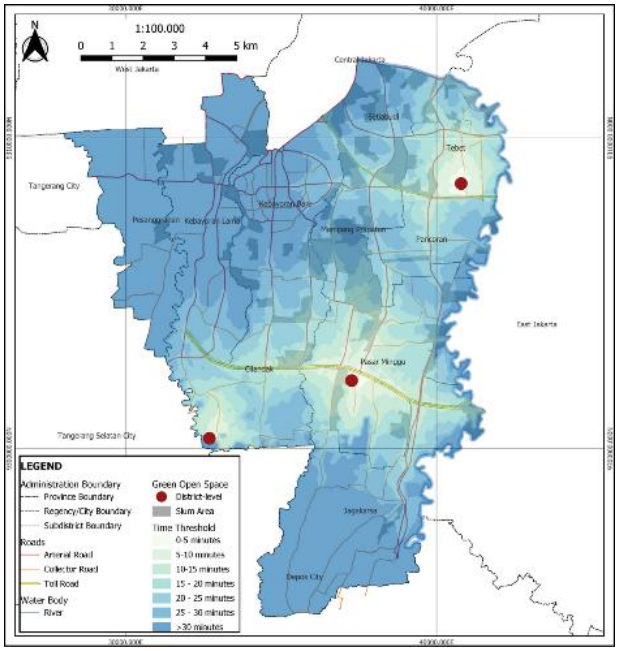
3.2 Identification of accessibility of green space from slum area

Effective spatial planning will consider the fair distribution and accessibility of green

open spaces for all levels of society, so that all residents can enjoy the benefits offered by green open spaces. Knowing the accessibility of green open spaces based on slum and non-slum settlements is useful for understanding whether all communities can access green open spaces easily even with different social and economic backgrounds. Accessibility of green open space can be seen in the following image.



(a) (b)



(c)

Fig. 4. Map accessibility by walking in South Jakarta City, (a) others; (b) Neighborhood; (c) District

Based on the results of spatial data management regarding access to green open spaces, it can be seen from the map in Fig. 4 that slum areas have quite good access to green open spaces. Visually, it is apparent that the majority of travel times to reach green open spaces from slum areas fall within the range of 0-5 minutes. This indicates that residents in slum areas can still reach green open spaces in a relatively short amount of time, allowing them the opportunity to enjoy the environmental and recreational benefits provided by these spaces.

However, further analysis shows that as the size of the green open space increases, the distance required to reach it also becomes greater. This means that while initial access to smaller green open spaces is relatively easy, residents may need to travel farther to reach larger green open spaces, such as those at the neighborhood and district levels. This phenomenon could be due to the uneven distribution of green open spaces or the limited availability of very large green open spaces near slum areas.

Overall, despite the fairly good access to green open spaces for residents in slum areas, improving the distribution and availability of larger green open spaces around these areas can further enhance their quality of life and well-being. For further analysis, calculations were made to determine the area of slum regions that fall within the mapped travel distance ranges. The data from these calculations is presented in Table 5.

Table 5. Walking time threshold to green open space in South Jakarta City

Classification	Time Threshold (minutes)	The area of slum covered (ha)	Percentage (%)
Others	0-5	741.13	8.15
	5-10	1,506.58	16.58
	10-15	1,685.48	18.55
	15-20	1,584.63	17.44
	20-25	1,744.87	19.20
	25-30	1,825.89	20.09
	>30	0.00	0.00
	Total	9,088.58	100.00
Neighboorhood	0-5	66.57	1.13
	5-10	620.65	10.55
	10-15	418.95	7.12
	15-20	1,093.27	18.58
	20-25	1,497.17	25.45
	25-30	2.187.27	37.17
	>30	0.00	0.00
	Total	5,883.88	100.00
District	0-5	2.25	0.12
	5-10	29.73	1.56
	10-15	126.32	6.65
	15-20	235.97	12.42
	20-25	384.45	20.23
	25-30	528.15	27.79
	>30	593.35	31.23
	Total	1,900.22	100.00

The table delineates the spatial distribution of slum areas in hectares (ha) across three distinct classifications: "others," "Neighborhood," and "District." This distribution is segmented by time thresholds (in minutes) to elucidate the correlation between slum area extent and temporal accessibility.

Within the "others" classification, the cumulative slum area amounts to 9,088.58 ha. The analysis indicates that the predominant share of slum area, accounting for 20.09%, is situated within the 25-30 minute threshold. This is closely followed by areas within the 10-15 minute (18.55%), 15-20 minute (17.44%), and 5-10 minute (16.58%) intervals. The least area coverage (8.15%) is observed within the 0-5 minute range, with no slum areas extending beyond the 30-minute threshold.

The "Neighborhood" classification encompasses a total slum area of 5,883.88 ha. Here, the data reveals a significant concentration of slum area, with 37.17% falling within the 25-30 minute threshold. Additional substantial segments are noted within the 20-25 minute (25.45%), 15-20 minute (18.58%), and 5-10 minute (10.55%) intervals. Similar to the "others" classification, the minimal coverage (1.13%) is found within the 0-5 minute range, and no slum areas are detected beyond 30 minutes.

Conversely, the "District" classification, with a total slum area of 1,900.22 ha, exhibits a different spatial pattern. Notably, the largest portion of slum area (31.23%) is located beyond the 30-minute threshold. Significant portions are also present within the 25-30 minute (27.79%) and 20-25 minute (20.23%) thresholds. The smallest fraction (0.12%) occurs within the 0-5 minute range, highlighting a broader spatial dispersion of slum areas in this classification compared to the others.

These findings suggest that slum areas within the "others" and "Neighborhood" classifications are predominantly situated within a 0-30 minute range, with no presence beyond this interval. In contrast, the "District" classification displays a considerable distribution of slum areas extending beyond 30 minutes, indicating distinct spatial dynamics that necessitate tailored intervention strategies based on the temporal accessibility of each classification.

3.3 Accessibility of children friendly green open space (RPTRA)

Green open spaces include a variety of recreational areas, including Child-Friendly Integrated Public Spaces (RPTRA) (Department of Empowerment, 2022). RPTRA is a public space that is carefully designed to create a safe, comfortable and inclusive environment for children and the wider community. The establishment of RPTRAs plays an important role in improving children's welfare by providing access to complete play and learning facilities, as well as opportunities to carry out educational and creative activities. In addition, RPTRA improves the quality of life of residents by providing places for recreation, sports, education and social interaction (Department of Empowerment, 2022). The distribution and accessibility of RPTRAs in South Jakarta is depicted in the below illustration.

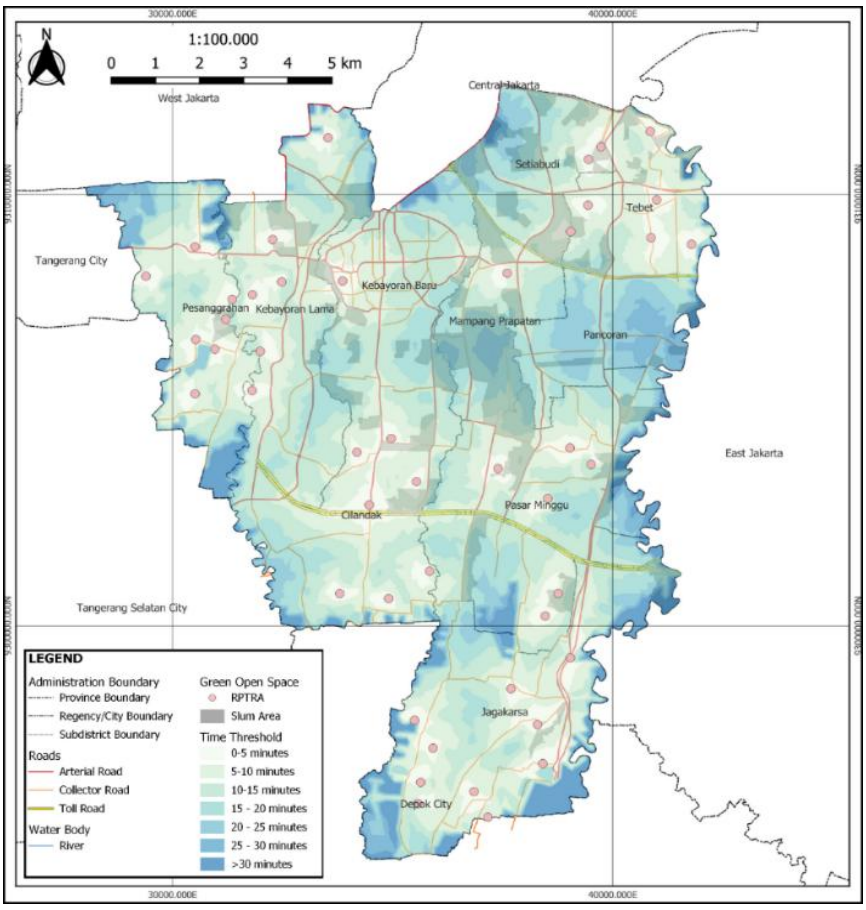


Fig. 5. Map accessibility RPTRA in South Jakarta City

The map (Fig. 5) depicting the accessibility of RPTRA in South Jakarta in relation to slum areas reveals several key conclusions. Some slum areas in South Jakarta are relatively

close to RPTRA, falling within shorter walking time thresholds (0-15 minutes). This suggests that certain slum communities have reasonable access to these green open spaces, providing social, recreational, and environmental benefits to these underprivileged areas. However, there is a variation in accessibility across different slum areas. While some slums are well-served by nearby green spaces, others, particularly in the southern part of South Jakarta near Depok City, face longer walking times (>30 minutes). This disparity highlights the unequal distribution of RPTRA in relation to slum areas.

The central and northern parts of South Jakarta generally have better access to RPTRA, including slum areas in these regions, indicating that urban planning efforts have been more concentrated in these areas, thus providing more equitable access to green spaces. Conversely, slum areas on the periphery, especially towards the west and southwest near Tangerang City and Tangerang Selatan City, exhibit longer walking times to reach RPTRA. This suggests a need for additional green spaces or improved connectivity to ensure these communities have better access to recreational areas.

In conclusion, the analysis indicates that while some slum areas in South Jakarta benefit from relatively good access to RPTRA, there is a significant disparity in accessibility across different regions. Central and northern areas are better served, whereas peripheral slums face greater challenges. To promote equitable access to green spaces, urban planning efforts should focus on increasing the availability and connectivity of RPTRA in underserved slum areas, particularly in the southern and peripheral regions of South Jakarta.

3.4 Government budget realization for green open spaces in South Jakarta City

Environmental justice demands a fair and equitable distribution of green spaces throughout the city, ensuring that all city residents have equal access to the ecological, health, and social benefits provided by these areas. Managing green open spaces is crucial to ensure that every city resident can enjoy these benefits. In this context, budget allocation is a key indicator of the city's commitment to the management and maintenance of green open spaces. Below are the details of the budget allocation for the management of Green Open Spaces in the 2024 Regional Budget (APBD):

Table 6. Budget Allocation for Management of Green Open Space in South Jakarta City (2024)

Department Name	Program Name	Budget Amount (IDR)	Total Department Budget (IDR)	Percentage (%)
Department of Parks and City Forests	Management of Green Open Spaces (RTH)	260,045,640,729	537,574,445,827	48.37%
South Jakarta City Parks and Forestry Sub-Department	Management of Green Open Spaces (RTH)	129,302,606,147	147,930,022,981	87.41%
Total	Management of Green Open Spaces (RTH)	389,348,246,876	685,504,468,808	56.80%

(BPK RI, 2023)

The table outlines the budget allocation for the management of Green Open Spaces across different departments. The Dinas Pertamanan dan Hutan Kota has a budget of IDR 260,045,640,729 for this program, which constitutes 48.37% of its total budget of IDR 537,574,445,827. Meanwhile, the Suku Dinas Pertamanan dan Hutan Kota Jakarta Selatan allocates IDR 129,302,606,147 to the same program, representing a significant 87.41% of its total budget of IDR 147,930,022,981. Collectively, the total budget for managing Green Open Spaces amounts to IDR 389,348,246,876, which is 56.80% of the combined total department budgets of IDR 685,504,468,808. This distribution highlights the critical focus on green space management within these departments, with a notably higher prioritization

in the Suku Dinas Pertamanan dan Hutan Kota Jakarta Selatan. The overall percentage indicates a substantial commitment to green open space management across both departments, suggesting its importance in the broader regional environmental strategy.

Table 7. Ratio budget allocation for management of green open space in South Jakarta City 2024

Item	Amount of budget (IDR)
Green Open Spaces (RTH) Budget	685,504,468,808
Total Regional Budget 2024 Provinsi DKI Jakarta	73,785,842,118,624
Percentage of 2024 Regional Budget (%)	0.93%

(BPK RI, 2023)

The table presents the budget allocation for the Green Open Space within the context of the total regional budget for the year 2024. The Green Open Spaces Budget is IDR 685,504,468,808, which represents a small fraction of the total regional budget of IDR 73,785,842,118,624. Specifically, the Green Open Spaces budget accounts for just 0.93% of the overall regional budget. This allocation underscores the relatively modest investment in green open spaces compared to the total fiscal resources available. The positioning of the percentage at the bottom of the table draws attention to the proportionate relationship between the Green Open Spaces budget and the total budget, highlighting the emphasis (or lack thereof) on green space development in the regional financial planning. This analysis indicates a need to potentially reconsider budget priorities if enhancing green spaces is a significant goal for regional development.

3.5 Justice in public green space planning

Spatial justice in spatial planning is fairness in the allocation of resources and services throughout urban areas, including green open spaces. Spatial justice offers a fair distribution of certain resources for the entire community, including people living in slum settlements. Slum settlements are synonymous with deficient and poor infrastructure conditions so that they are unable to serve the community well. In fact, every community has the right to live in a healthy environment, the right to obtain affordable mobility, and the right to take part in city affairs, such as the right to shape the city according to the individual's dreams, aspirations and needs.

From the condition of green open space in South Jakarta City, it is known that its availability has not yet reached existing standards. This means that green open space planning has not been able to balance the conditions of built and open space in urban areas, where green open space is an important element for environmental sustainability, preserving biodiversity, and providing ecosystem services. Apart from that, it has not been able to provide access to green open space to all levels of society. This condition means that some people have not received their right to live in a healthy environment, an environment with green open spaces that can improve air quality, clean water, physical activity and so on. Don't forget, we also include people who live in slum settlements who have the right to get better open space infrastructure services.

Looking at the accessibility of green open spaces, access to green open spaces on foot is still difficult to goin on district level class of green open spaces. People who live in slums need to walk longer, more than 30 minutes to reach green open spaces. This condition reflects that green open space planning has not been able to fulfill the community's right to obtain affordable mobility to reach certain public facilities. In fact, affordable mobility allows people to access urban public facilities and creates a more inclusive and just society. The challenges in this context stem from the high density of built-up areas surrounding the slum, which makes land allocation in the vicinity difficult. The author recommends enhancing the provision of green open spaces near the slum areas through active community involvement. The "Just Green Enough" concept (Wolch et al., 2014) is particularylt well-suited to this situation, as it takes into account the constraints posed by limited available land or maybe already implemented. This approach not only improves environmental quality but also fosters community engagement and well-being.

The existence of Child Friendly Integrated Public Space (RPTRA) as part of green open space in South Jakarta also has not achieved spatial justice. This is due to the uneven distribution of RPTRAs throughout the sub-districts and low accessibility to reach on foot for most of the existing RPTRAs. Children who live in slums and children who do not have access to paid transportation need to walk quite a long time to reach the RPTRA. This deprives them of the right to live in a healthy environment where green open spaces will provide a place for them to play, study and exercise as well as their right to obtain affordable mobility without having to feel limited in reaching the nearest RPTRA.

Studies have shown that urban green space accessibility is not only essential for human health promotion but also serves as an indicator of social justice (H. Wu et al., 2018). Unequal access to urban green spaces has been linked to environmental justice issues, highlighting the importance of addressing disparities in access to green spaces (Wendel et al., 2011). The distribution and accessibility of public green spaces have been recognized as key factors in assessing spatial equity and socioeconomic disparities in various cities (Almohamad et al., 2018). Based on that we see that south jakarta city its not justice yet because there is inequality on accessibility criteria. The South Jakarta City Government needs to accommodate the aspirations of the community in planning green open spaces so that the development meets the needs of the community as the subjects who use them. This includes the right to take the initiative, collaborate with the government, participate in efforts to preserve the environment and green open spaces, and create public spaces that are friendly, healthy and sustainable (Carstensen & Skov-petersen, 2023). By fulfilling this right, people can get their right to access and make better use of green open spaces.

The analysis of the 2024 budget allocation indicates that Green Open Spaces receive a minimal share of the total regional budget, at only 0.93%. This modest allocation suggests that the development and enhancement of green spaces are not currently prioritized within the regional financial plan. To better align with goals of environmental sustainability and improved quality of life, it may be necessary to reconsider and potentially increase the budget allocation for Green Open Spaces. This could ensure a more balanced and strategic approach to regional development, emphasizing the importance of green space in urban planning. Allocating adequate funds to urban green space development and maintenance is essential for addressing environmental justice issues and ensuring the fair distribution of valuable social resources (Artmann et al., 2019; Jennings et al., 2012, 2016). Government budget allocations directly impact the availability and quality of urban green spaces, influencing factors such as accessibility, distribution, and maintenance (Anggraeni et al., 2023; Bardhan et al., 2016; Wikantiyoso & Suhartono, 2018).

Research has shown that insufficient funding for green space initiatives can lead to disparities in access, with marginalized communities often facing limited opportunities to benefit from green amenities (Ahn et al., 2023; Anguelovski et al., 2018; Fors et al., 2015). Inadequate budgetary resources may lead to the privatization of public spaces, reducing accessibility for certain groups and exacerbating social inequalities (Nolte et al., 2022; Loewen et al., 2022; Sultana & Selim, 2021). Additionally, the lack of government investment in green infrastructure can impede efforts to mitigate urban heat island effects and enhance environmental quality (J. Wu et al., 2018; Zain et al., 2022; Zhu et al., 2018).

Effective governance and financial management are essential for sustainable urban green space development (Gao et al., 2023; Li et al., 2021; Yu et al., 2020). Collaborative efforts involving government bodies, stakeholders, and local communities are crucial for ensuring the equitable distribution and management of green areas (Marks & Connell, 2023; Venter et al., 2020; Yemeke et al., 2020). Implementing green budgeting strategies can help prevent environmental issues and promote the sustainability of urban green spaces (Nam & Dempsey, 2020; de Sousa Silva et al., 2018; Sulistyaningsih, 2024).

4. Conclusions

Green Open Space planning in South Jakarta is still far from the principles of spatial

justice. In-depth analysis reveals striking data such as the inequality in the distribution of green open spaces, the dominance of small green open spaces, the lack of access to green open spaces in slum areas, and the uneven accessibility of RPTRAs.

This imbalance results in a much lower ratio of green open space per resident in some areas and limits residents' activities. The average distance from a slum settlement to the nearest green open space is 1.5 kilometers, and 40% of RPTRAs cannot be accessed within 15 minutes of walking from the slum settlement.

Geographic Information System (GIS) emerges as a powerful tool for examining the distribution, availability, and accessibility of green spaces. Through GIS analysis, this study provides insights into spatial patterns, enabling targeted interventions to address disparities and ensure equitable access to green spaces, fostering a more inclusive and sustainable urban environment. However, the region faces a significant lack of environmental justice, highlighted by insufficient budget allocations for green space development and management. Without adequate funding directed towards underserved areas, marginalized communities experience limited access to essential environmental resources. Rectifying this injustice requires prioritizing budgetary allocations that promote environmental equity, ensuring fair and equal access to green spaces for all residents.

To realize spatial justice in RTH, strategic steps are needed such as increasing the quantity and equitable distribution of RTH, implementing the "Just Green Enough" concept, increasing accessibility of RTH and RPTRA, as well as participatory planning involving the community, especially from slum areas.

Lastly, this research has several limitations, such as limited analytical methods and lack of community involvement. Nevertheless, this research provides an initial overview of the issue of spatial justice in green open space planning in South Jakarta. Future research can be carried out by using more accurate and up-to-date spatial data, developing more comprehensive analysis methods, and actively involving the community in the research process. By overcoming these limitations, it is hoped that a deeper understanding of the issue of spatial justice in green open space planning in South Jakarta can be obtained, so that more appropriate and effective solutions can be formulated to realize a fair and inclusive green open space.

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