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Original Article

The Dynamics of Public Green Open Space Availability in Ciputat District, South Tangerang City, 2011–2025

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ABSTRACT
South Tangerang City, especially Ciputat District, with its high development growth, has implications for the lack of conversion of public green open space in urban areas. In assessing the availability of green open spaces, the thing that needs to be considered is the extent to which the green open spaces are available and their suitability with the Regional Spatial Plan. This study aims to analyze the availability of public green open space in Ciputat District from 2011 to 2025 and their suitability in the Ciputat District Regional Spatial Plan. The research method used in this study is a quantitative descriptive approach with final data processing using the ArcGIS application with overlay and digitization methods. The results of the study show that public green open spaces in Ciputat District have changed from 2011 to 2025, which was originally 16,268 Ha to 16,848 Ha . Ciputat District has a public green open space of 3.8% of its area, which is still considered insufficient or not ideal to meet the 20% public green open space requirement for each area as determined by the Regional Spatial Plan.

KEYWORDS
Regional Spatial Planning;
Public Green Open Spaces;
GIS.

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INTRODUCTION

Green open space is a resource allocated by city governments for public use and ownership (Harahap, 2015). Rapid development often neglects green open space, which has the function and value of maintaining air quality (Tulandi, 2022). Various cities in Indonesia are experiencing limitations availability room open green the public must quick overcome through participation active stakeholders interest as well as support from public local (Sulistyaningsih et al., 2024). Development in a region aims to meet the needs of local communities and provide positive impacts, especially in the economic aspect (Nugraini et al., 2023). The increase in population and activity in urban areas triggers changes in the characteristics of cities, both physically, socially, and culturally, which are marked by the emergence of problems such as traffic jams, flooding, slums, and pollution (Nurhanafi et al., 2016). The social function of public green open spaces is generally inseparable from its connection with local culture (Hindira Hastita et al., 2020). However, the

high cost of land acquisition is also one of the main factors that complicate efforts to increase the number of green open spaces in an area (Nurfadhil & Zain, 2024).

Another factor is the attention to urban green open spaces in various countries with varying income levels due to socioeconomic conditions (Zhang et al., 2021). Research Muliasari et al., (2021)confirms that land use changes generally occur in economically developing areas. According to , the issue of green open spaces has not been considered a priority program in urban development policies. The need for public green open spaces as recreational (Hafiz et al., 2023)spaces continues to increase, but is not commensurate with its availability due to uncontrolled development (ES Kurniawan et et al. , 2019) . This condition reflects the dynamics of permanent changes in land use patterns that are inconsistent with spatial utilization plans, making it difficult to avoid. According to Law Number 26 of 2007, public and private green open spaces require each region to have 30% of its total area as green open space. This green open space is divided into 20% public and 10% private. Green open spaces are part of the space within a city that can take the form of a region, a specific area, or a long path (Gufroni et al., 2017).

Ciputat District is located in the central part of South Tangerang City, with diverse regional characteristics and a high density of community activity. Public green open spaces in Ciputat District are not all spread across all the sub-districts within the district, and public green open spaces in Ciputat District are also lacking in terms of facilities and infrastructure . room open green in the District Ciputat Not yet evenly distributed in every sub-districts , as well as their distribution Still Not yet Balanced . In assessing the availability of green open space, it is important to consider the extent to which the green open space is available and its compliance with the regional spatial plan (Kelana et al., 2018). Regional spatial planning is a process that includes the analysis and management of optimal land use, taking into account social, economic, environmental, and cultural aspects (Kogoya et al., 2024). According to Imansari & Khadiyanta (2015), the category of green open space includes urban forest green space, green belt green space, green space along railway lines, water sources, and cemeteries. This is in line with the *Three Levels of Urban Green Space Provision theory* by (Biernacka & Kronenberg, 2019), which states that urban green open space includes all types of green spaces in the city, such as forests, parks, gardens, cemeteries, former industrial land, and green areas along railway lines, regardless of management. Furthermore, this can help examine the availability, accessibility, and attractiveness of green open space as a means of providing green open space. This theory encompasses availability, accessibility, and attractiveness.

Open space green own influence positive for welfare human beings , because That evaluation availability room open green the public is very important for government For reach quality environment decent urban areas for all (Stessens et al., 2021). in research (Wayan Wiryawan, 2023), one of factor constraint arrangement room open green that is low participation sector private in opening room open green . Therefore that , it is needed structured and planned arrangements by the government city for its benefits truly felt public (Sihombing et al., 2021). Change of function room open green become forest the city also allows inhabitant city utilize the area optimally at once help increase quality air (Siregar et al., 2024).

Various studies international has Lots explore dynamics room open green city in term long time and the impact to population , accessibility , and distribution spatially . In the study previously by (Zhai et al., 2024), in 320 cities in China 2000-2020 reveals decline cover green and change distribution of green open space to population . Research other previously next by (S. Liu et al., 2021), in Shanghai taking advantage of approach intensity and metrics landscape For see trend changes and connectivity of UGS in period 1990–2015. other research by (Y. Liu et al., 2024), in Taiyuan, China changes spatial green open space from 2000 to 2022 was analyzed use index structure landscape . Research by (Chen & Huang, 2021), in Beijing also compared dynamics of green open space with need population in urban and suburban areas in 2005 and 2025.

Study previously show that research conducted in urban areas or scale national , and tends to stop at period around 2020–2022 . Not much yet research that examines dynamics availability of public green open space in a way spatial and temporal in range more from One decades at the small regional level , such as sub-district . In Indonesia itself , especially in the sub-district Ciputat , not yet found studies that document changes to public green open space from 2011 to 2025

Novelty study This located in Focus on the scale area micro like subdistrict with coverage time long make study This unique and different from studies previously . In addition

, research This lies in the use approach term long in study change availability room open public green space (RTH) in the District Ciputat throughout 2011 to 2025, which is still seldom discussed in research local previously .

This study focuses on the dynamics of public green open spaces in Ciputat District. The purpose of this study is to analyze the availability of public green open spaces in Ciputat District in 2011-2025 and its suitability in the Ciputat District Spatial Planning Plan, which is used for sustainability to focus more attention on the green open spaces provided to achieve environmental sustainability standards in urban areas.

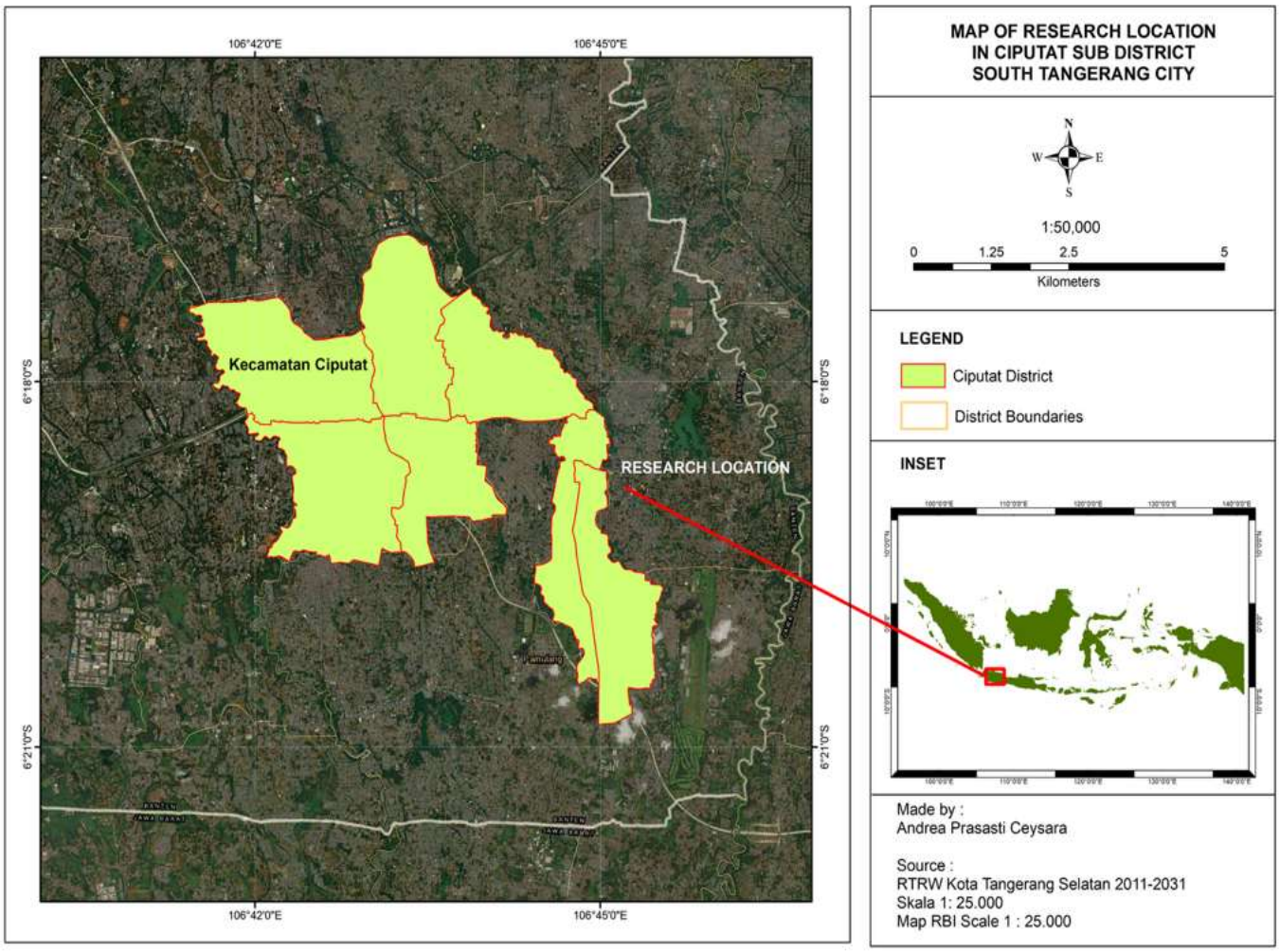

Figure 1. Research Location

METHOD

The area that is the focus of this research is Ciputat District, South Tangerang City. Ciputat District is located in the central part of South Tangerang City. Administratively, Ciputat District is directly adjacent to Ciputat Timur District to the north, Pamulang District to the east, Setu District to the south, and Pondok Aren District to the west. The area of Ciputat District is 19.31 km2 , with an altitude of 44 meters above sea level. Ciputat District is divided into 7 administrative areas of urban villages.

Ciputat District was chosen as an area showing significant growth in infrastructure, housing, and the economy. This situation makes the area vulnerable to land conversion, including a lack of public green open space. Furthermore, Ciputat District reflects complex urban dynamics, making it a suitable case study to examine the influence of spatial planning policies and urbanization pressures on the availability and the pressure of urbanization on the availability and distribution of green open spaces.

Approach Study

Study This use A descriptive quantitative approach utilizing Geographic Information System techniques, supported by observation and visual data collection, was conducted to review the existence of public green open space in Ciputat District, South Tangerang City. GIS development also considers spatial analysis aspects that rely on GIS capabilities in processing and analyzing spatial data (Ballo, 2023).

Procedure Study

In this study, the availability of public green open space is analyzed based on existing data, then its compliance with the RTRW provisions is analyzed, and the need for public green open space is calculated based on the area of Ciputat District. Data and information will be processed using ArcGIS, specifically Arcmap.

Data analysis

Data collection is carried out to obtain information about how large an object or phenomenon is by comparing it to predetermined sizes (Hikmawati, 2020)The data collection techniques used in this study are primary data sourced from *Google Earth Pro* , SAS Planet, and related agencies, and then proven through observation. Utilization of Google Earth Earth enables efficient and sustainable monitoring (Sudjana & Astarika, 2024). The secondary data needed in this study were obtained from other sources such as BPS and journals. Analysis changes to green open space were made For know level changes that occur in space open green between 2011 and 2025. In this process , the calculation wide changes that occur, then required formula:

$$\Delta L = \mathrm{L2} - \mathrm{L1}$$

Information :
ΔL= Changes in open space land in 2011 and 2025
L2 = Green Open Space Area in 2011
L1 = Green Open Space Area in 2025

Analysis of the Availability of Public Green Open Space to make it easier to calculate the area of public green open space availability based on the area according to Spatial Planning Law Number 26 of 2007, the following formula is needed:

$$\text{Public Green Open Space} = \frac{\text{Total Area}}{100} \text{ X } 20$$

RESULTS AND DISCUSSION

Ciputat District is located in the central part of South Tangerang City. Astronomically, Ciputat District is located at 106 °69" – 106 °72" East Longitude and 6 °28" – 6 °32" South Latitude. Administratively, Ciputat District is directly adjacent to East Ciputat District to the north, to the east to Pamulang District, to the south to Setu District, and to the west to Pondok Aren District. The area of Ciputat District is 19.32 km^2, with an altitude of 44 meters above sea level. Ciputat District is divided into 7 administrative areas of sub-districts.

Table 1. Area of Region According to Subdistricts in the District Ciputat

Ward	Area (Km ^{2})	Percentage of District Area (%)
Sarua	3.79	19.63
Jombang	3.57	18.48
New Rice Fields	2.98	15.44
Beautiful Sarua	2.04	10.56
Ricefield	2.61	13.51
Ciputat	1.83	9.49
Cipayung	2.49	12.89
Ciputat District	**19.32**	**100.00**

Source:(Badan Pusat Statistik, 2024)

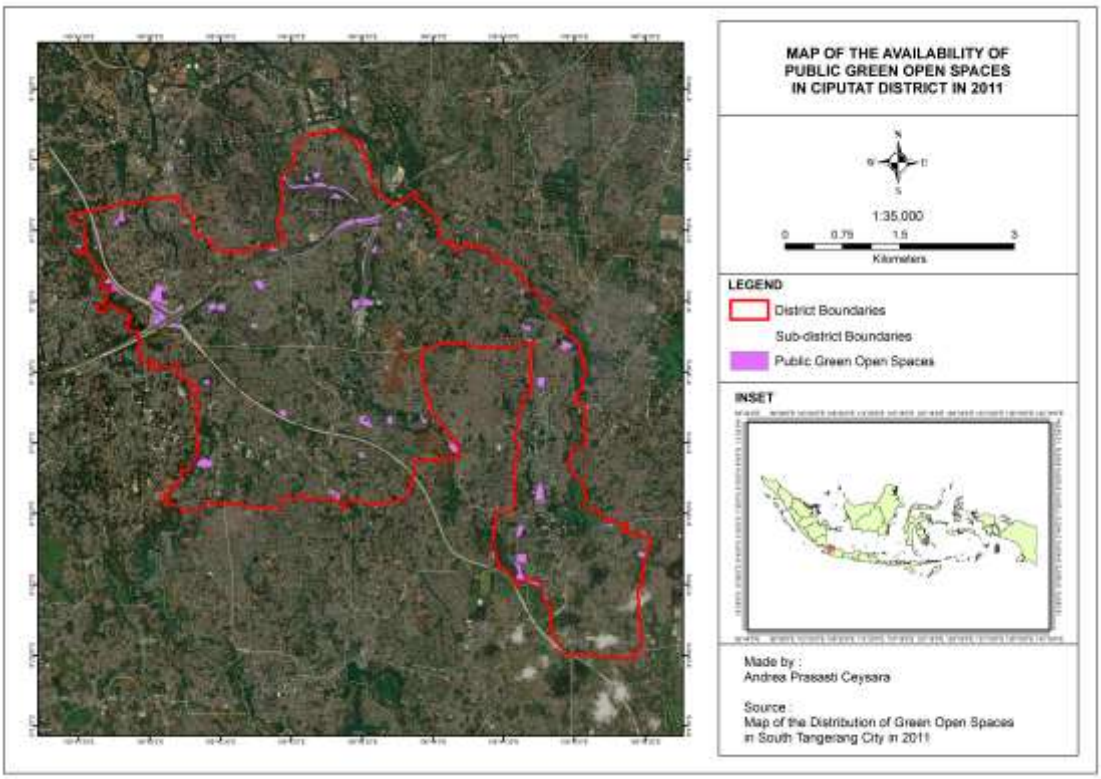

Figure 2. Map of Subdistrict RTHP Availability Ciputat 2011
(Source : Research Results , 2025)

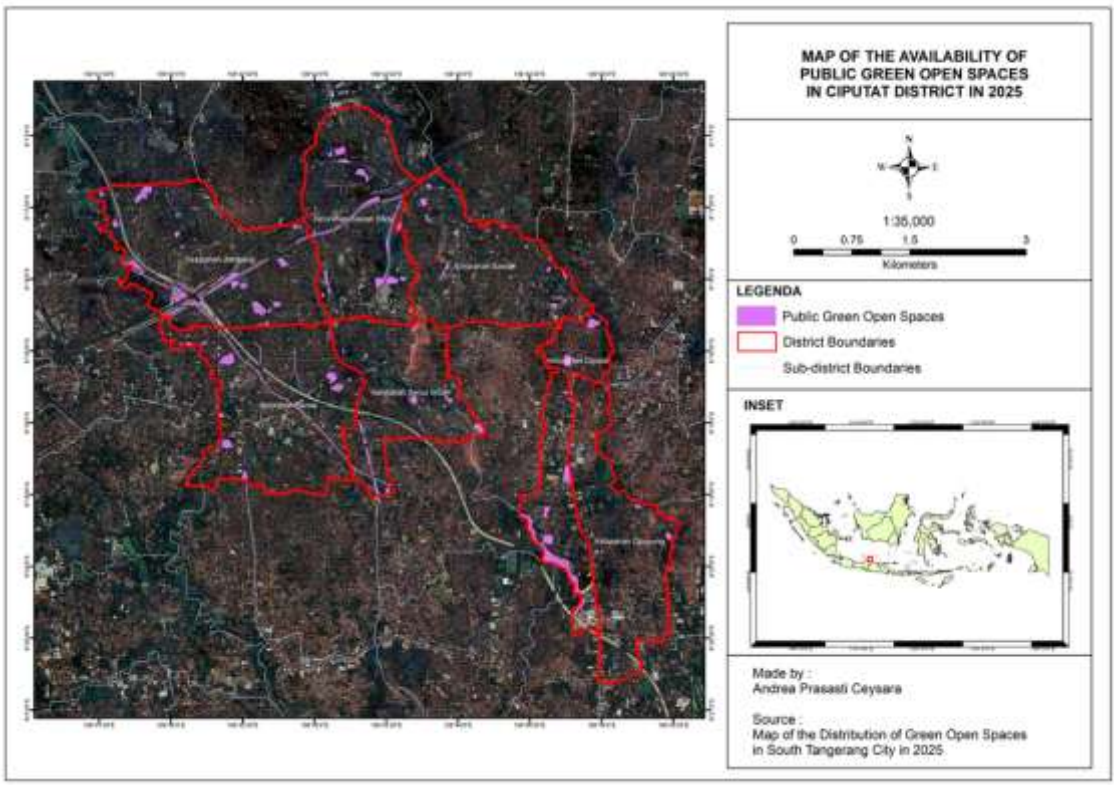

Figure 3. Map of Sub-district RTHP Availability Ciputat 2025
(Source : Research Results , 2025)

Based on Figure 2 shows distribution and area availability of public green open space in the sub-district area Ciputat, South Tangerang City, based on usage data land 2011. Availability of public green open space in the sub-district Ciputat in 2011 covered 10.3 % of the total area. Type of public green open space dominated by cemeteries, parks cities and routes green.

Based on Figure 3 shows distribution and area availability of public green open space in the sub-district area Ciputat , South Tangerang City, based on usage data land 2025. Availability of public green open space in the sub-district Ciputat in 2025 will be as wide as 9.85% of the total area . Types of public green open space dominated by cemeteries , parks cities and routes green .

Analysis results Public green open space needs based on area of 2011-2025 District Ciputat own area of 19.32 km2, in general administrative consists of from 7 sub-districts and urban villages widest that is Ward Sarua with area of 3.79 km2. In accordance with Law Number 26 of 2007 which became runway main in compilation Plan Regional Spatial Planning has determined that a city/region needs at least 20% of its total area as public green open space. Calculating the need for public green open space based on area size is done to determine whether the availability of public green open space meets established standards or falls short of the required requirements.

Table 2. Availability of RTHP Based on Law No. 26 of 2007 (RTRW)

Ward	Area (Km^2)	RTHP requirements based on area (Km^2)	Findings (Km^2)		Information	
			2011	2025	2011	2025
Sarua	3.79	0.75	0.30	0.30	Does not meet the	Does not meet the
Jombang	3.57	0.71	0.58	1.16	Fulfil	Fulfil
New Rice Fields	2.98	0.59	0.39	0.39	Does not meet the	Does not meet the
Beautiful Sarua	2.04	0.40	0.22	0.22	Does not meet the	Does not meet the
Ricefield	2.61	0.52	0.24	0.24	Does not meet the	Does not meet the
Ciputat	1.83	0.36	0.55	0.55	Does not meet the	Does not meet the
Cipayung	2.49	0.49	0.11	0.11	Does not meet the	Does not meet the
Amount	19.32	3.82	2.39	2.97	Does not meet the	Does not meet the

Source: Digitization, 2025

Based on the data in table 2, the public green open space available in the sub-district Ciputat own area 3.82 km^2 from overall area. Subdistrict Sarua as the largest area need public green open space covering an area of 0.75 km2, while Ward Ciputat which has smallest area need public green open space of 0.36 km^2. The results of analysis table show that six from seven sub-district in the district Ciputat Not yet fulfil public green space needs based on proportion area . Subdistrict the covering Sarua, New Rice Fields, Beautiful Sarua, Rice Fields, Ciputat, and Cipayung.

Analysis results based on provision Constitution Number 26 of 2007 concerning Spatial Planning, minimum 20% of city or district area become a public green open space area. With wide approximately 19.32 km^2, then ideal need for public green open space in the sub-district Ciputat is of 3.82 km^2. However, the results mapping and analysis show that the green open space is available moment This new reaching 2.39 km^2. Distribution of public green open space Not yet evenly, with concentration the biggest located in the sub-district area Jombang, while other areas show low availability.

Conditions This indicates that management and provision of public green open space in the sub-district Ciputat need improved.

Table 3. Availability of RTHP in Sub - districts Ciputat 2011-2025

Subdistrict	*Existing* RTHP Area in 2011 (Km^2)	*Existing* RTHP Area in 2025 (Km^2)	Difference (Km^2)
Ciputat	0.16268	0.16848	0.0058

Source : Analysis results , 2025

From the results analysis Table 3, then can concluded wide room open green public in the District Ciputat South Tangerang is increasing of 58 m^2, This show that wide room open green public in the District Ciputat experience increase in period 14 years since expansion South Tangerang city from Tangerang Regency.

Table 4. Distribution of Types and Areas of Public Green Open Space in Sub-districts Ciputat 2011

Types of Public Green Open Space	Green Open Space Location	Area (ha)	%
Green Open Space (RTH) TPU	Burial	5,099	3.13%
Green Line Green Open Space	Ciputat Flyover Lower Corridor (Reading Park)	2,153	1.32%
Subdistrict Green Open Space	Green Open Space and Parks in the Ciputat Area	1,632	1.03%
City Park Green Open Space	Park Under the Ciputat Flyover, Ciater Corner Park Vertical Garden and Pedestrians on Jl. Raya Ciater	6,098	3.75%
Green Open Space (RTH) Taman RW	Green Open Space at Pembangunan Jaya University, Children's Playground in Ciputat Baru Housing Complex Senior Park in the Bukit Indah Complex	1,286	0.8%
Ciputat Total		**16,268**	**10.3%**

Source : DCKTR and Processing Results, 2025

Furthermore, the calculation of spatial suitability in the planning of the Ciputat District Spatial Plan, as shown in Table 4, indicates several types of public green open spaces within the district. There are five categories of public green open space in Ciputat District, namely: cemetery green open space (TPU RTH) covering an area of 5.099 hectares; green belt open space covering 2.153 hectares; sub-district green open space covering 1.632 hectares; urban park or city forest open space covering 6.098 hectares; and neighborhood park (RW park) open space covering 1.286 hectares.

After determining the area of each type of public green open space, the total area can be calculated. The total public green open space available in Ciputat District in 2011 amounted to 6.268 hectares of the total area of the district.

Table 5. Distribution of Types and Area of Public Green Open Space in Sub-districts Ciputat 2025

Types of Public Green Open Space	Green Open Space Location	Area (ha)	%
Green Open Space (RTH) TPU	Burial	5,099	3.02%
Green Line Green Open Space	Ciputat Flyover Lower Corridor (Reading Park)	2,153	1.27%
Subdistrict Green Open Space	Green Open Space and Parks in the Ciputat Area	1,632	0.9%
City Park Green Open Space	Park Under the Ciputat Flyover, Ciater Corner Park Vertical Garden and Pedestrians on Jl. Raya Ciater Jombang Forest City Park	6,678	3.96%
Green Open Space (RTH) Taman RW	Green Open Space at Pembangunan Jaya University, Children's Playground in Ciputat Baru Housing Complex Senior Park in the Bukit Indah Complex	1,286	0.7%
Ciputat Total		**16,848**	**9.85%**

Source : DCKTR and Processing Results , 2025

In Table 5, the types of public green open spaces in Ciputat District are presented. There are five categories of public green open space, namely: cemetery green open space (TPU RTH) covering an area of 5.099 hectares; green belt open space covering 2.153 hectares; sub-district green open space covering 1.632 hectares; urban park or city forest open space covering 6.678 hectares; and neighborhood park (RW park) open space covering 1.286 hectares.

After determining the area of each type of public green open space, the total area can be calculated. The total public green open space available in Ciputat District in 2025 is projected to reach approximately 22.068 hectares of the district's total area. Image-based analysis allows for the identification of changes in the availability of public green open spaces in Ciputat District during the period from 2011 to 2025. The availability of public green open space in 2011 was recorded at 16.268 hectares, while in 2025 it is projected to increase to 16.848 hectares.

A significant increase occurred in the category of urban park green open space, particularly in the Jombang City Forest Park, which covers an area of 5.8 m^2. This park has been officially designated by the government since 2013 and has now become a popular recreational destination, featuring more complete green open space facilities such as riverfront areas and sports fields, as illustrated in Figure 4.

The availability of public green open space in Ciputat Sub-district remains limited and unevenly distributed. Availability refers to both the total area and the number of public green spaces within the Ciputat Sub-district. One of the main factors influencing this availability is urban planning. The attractiveness and accessibility of each public green open space in Ciputat are also suboptimal. Accessibility, in this context, refers to the ease with which the public can utilize green spaces, which is influenced by the availability of supporting infrastructure such as pedestrian pathways.

Furthermore, the attractiveness of public green open spaces is determined by several factors, including the presence of vegetation, urban forests, and recreational or sports facilities such as playgrounds and green tracks. According to Muladi and Hadi (2025), vegetation within green open spaces can absorb solar radiation, thereby reducing surface heat absorption and helping to lower air and surface temperatures in the surrounding areas. Changes in vegetation cover directly affect the stability of public green open spaces. Darmawan et al. (2022) emphasized that large-scale land cover changes from dense forest or vegetation areas to mixed gardens, shrubs, or residential zones can significantly impact the stability of green spaces.

This aligns with the findings of Wang et al. (2019),

who noted that green open spaces should contain a variety of vegetation types and include recreational and sports facilities. Appropriate vegetation can enhance the function of green open spaces by reducing pollution, noise, and soil erosion. However, Mbele and Setiawan (2016) asserted that city parks as public spaces are not optimally beneficial if the design and placement of shade vegetation are inappropriate. The existence of well-designed public parks can contribute significantly to increasing the overall quantity and quality of public green open spaces (Dharmadiatmika, 2017).

Figure 4. *River* Boundary and Sports Arena in Jombang City Forest Park
Source : Researcher Documentation , 2025

The availability of public green open space in Ciputat Sub-district remains limited and unevenly distributed. Availability refers to both the total area and the number of public green open spaces within the sub-district. One of the key factors influencing this availability is urban planning. The attractiveness and accessibility of each public green open space in Ciputat are also suboptimal. Accessibility refers to the ease with which the public can utilize green open spaces, which is influenced by the availability of supporting infrastructure such as pedestrian pathways. Furthermore, the attractiveness of public green open spaces is determined by several factors, including the presence of vegetation, urban forests, and recreational or sports facilities such as playgrounds and green tracks.

According to Muladi and Hadi (2025), vegetation within green open spaces can absorb solar radiation, thereby reducing surface heat absorption and contributing to lower air and surface temperatures in surrounding areas. Changes in vegetation cover directly weaken the stability of public green open spaces. Darmawan et al. (2022) emphasized that large-scale land cover changes from dense forest or vegetated areas to mixed gardens, shrubs, or residential zones can significantly affect ecological stability. Similarly, Wang et al. (2019) highlighted that green open spaces need to include diverse vegetation types and provide recreational and sports facilities. The selection of suitable vegetation can enhance the functions of green open spaces in reducing pollution, noise, and soil erosion. However, Mbele and Setiawan (2016) argued that city parks as public spaces will not be optimally beneficial if the design and placement of shade vegetation are inappropriate. Well-designed public parks can contribute significantly to increasing both the quantity and quality of green open spaces (Dharmadiatmika, 2017).

Regional development and government efforts to provide infrastructure and public services can increase land-use demand (Soemantri Brojonegoro & Lampung, 2018). Between 2011 and 2025, Ciputat Sub-district has

experienced dense development, dominated by commercial and residential land use. This trend is understandable given that Ciputat is the closest area directly bordering South Jakarta City, making it highly attractive for continuous expansion. Luhukay et al. (2019) stated that not all land is suitable for residential development. Wijaya (2015) further confirmed that, over time, urban development tends to expand toward peripheral areas. Tianingsih and Antomi (2021) found that health, education, and economic facilities are key factors influencing changes in the area of public green open space. Aji (2021) reported that paddy fields and forest areas continue to shrink as a result of conversion into residential land. One of the factors contributing to the lack of public green open space is the human resource factor. Fajarida (2024) emphasized that a lack of public understanding regarding the role of green spaces, as well as spatial planning problems, are major challenges.

Figure 4 illustrates an example of successful government efforts in Ciputat Sub-district to provide recreational and urban green facilities. These findings indicate that public green open spaces in urban areas require an ecological spatial framework. This is consistent with Stessens et al. (2021), who argued that an integrative, accessible, and sustainable green ecological network should be a key objective of sustainable urban development, particularly as a strategy for climate change mitigation and adaptation.

Public green open space plays an important role in the urban spatial structure because it contributes to ecosystem balance while providing a social arena for community activities. The development of an area requires stable natural resources and environmental support (Su et al., 2022). Therefore, the planning and implementation of public green open space and spatial plans (RTRW) are crucial elements in maintaining urban environmental sustainability. An analysis of the alignment between spatial planning policy and the availability of public green open space in Ciputat Sub-district can illustrate the extent to which spatial planning supports environmentally friendly urban development. According to Taufiq (2015), long-term spatial development aims to create safe, comfortable, productive, and sustainable spaces.

Ciputat Sub-district has the potential to fulfill the 20% public green open space requirement by optimizing the use of existing parks and open spaces across various building types both government-owned, such as offices, schools, campuses, and road medians, and those owned by the private sector. In line with the findings of Aldino and Suharno (2022), the role of public green open space as a place for social interaction can still be realized despite various limitations.

CONCLUSION

Public green open space in Ciputat Sub-district has experienced changes between 2011 and 2025, increasing from 16.268 ha to 16.848 ha. Currently, Ciputat Sub-district has a total proportion of public green open space equivalent to 3.8% of its total area. This figure is still considered inadequate or below the ideal standard of 20% of developed land area, as stipulated in the Regional Spatial Planning Plan (RTRW). Public green open spaces in Ciputat are directly utilized by the community for various social and ecological activities. However, this study is limited in that it primarily focuses on spatial aspects specifically, the area and distribution of public green open spaces without exploring their social functions or the level of community utilization. The provision of public green open spaces in Ciputat Sub-district can be enhanced through the utilization of vacant land, the development of green corridors, the planting of vegetation along riverbanks, and the optimization of river buffer zones as ecological green belts.

This study also has methodological limitations, as the approach used is descriptive-quantitative and has not yet examined in depth the social aspects or public perceptions regarding green open space. Future studies are expected to further explore these dimensions to provide a more holistic understanding of the social, cultural, and ecological significance of urban green space. Advanced research on this topic is also expected to contribute to the development of more comprehensive policies for the management of public green open spaces in the future, with a broader and more integrative approach to sustainable urban planning.

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Conflict of Interest The author has no competing interests to declare that are relevant to the content of this article.

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