



ADEQUACY AND SUITABILITY OF GREEN OPEN SPACE IN MEDAN KOTA DISTRICT

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ABSTRACT

This study aims to analyze the availability of green open space through the interpretation of green open space in several years in the Medan Kota District, evaluate the implementation of green open space related to the adequacy aspect, analyze projections of green open space needs based on population growth, and analyze spatial-based spatial management policies in urban villages in Medan Kota District in an effort to meet the adequacy and suitability standards of green open spaces. The type of research used is descriptive with a qualitative approach. The location of this research was in Medan Kota District, Medan City. The analysis used in this study is spatial analysis through the application of Geographic Information Systems (GIS). The results of the study show that the availability of green open space in the Medan Kota District within 3 years has changed the area of green open space. In 2018, the area of green open space in the Medan Kota District was 128.105 ha. The area of green open space in Medan Kota District in 2021 will be 89,768 ha. The adequacy of green open space based on the area of Medan Kota District is 598,068 ha. The provision standards for green open space in Medan Kota District have not been met. Of the 20% standard, Medan Kota District only has 89,768 ha, or still lacks 29,846 ha. The projected need for green open space based on the population of Medan Kota District has been fulfilled, but the distribution is not evenly distributed. The directive to fulfill a minimum area of 20% green open space from total area can be carried out through the following mechanisms: purchasing and/or land acquisition; management; land leasing; community cooperation; and/or increasing the quantity and quality of green open space.

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INTRODUCTION

Urban space utilization is under a lot of strain from population increase, the building of homes, hotels, retail malls, and other services. Additionally, it will result in a reduction of open spaces, including both green and non-green open areas (Ridayati, 2017). The development of the spatial plan for Medan City is essentially an expansion of the National and Provincial Regional Spatial Plans (RTRW) into a plan for implementing the use of urban space. Utilization and control are based on the comprehensive spatial plan for Medan City. As required by law. Invite No. 26 of 2007 states that districts or urban areas must make plans regarding the provision and utilization of green open space of at least 30% of the total area. The green open space in question is in the form of public green open space of 20% and private green open space of 10%.

The overall area of Medan City is 26,510 hectares, with a built-up area of around 16,435 ha, or 62% of the total area, and a limited amount of green open space. The 4,587 hectares (roughly) Medan City Green Open Spaces include urban woods, city parks, village parks, district parks, and cemeteries of 12 districts (Perda Kota Medan No. 1 Article 22, 2022). This is a result of the enormous population that is urbanizing and continuing to increase both from inside the city. While housing facilities have increased in response to this extremely fast population expansion, green open space has not.

Based on the Spatial Pattern Map, the area of Green Open Space in Medan City is 4,587 ha or 16.8%, but through land acquisition of Green Open Space by 20% according to the Commitment Letter of the Mayor of Medan in order to fulfill 20% of public green open space as stated in the Letter of the Mayor of Medan Number 650/9883 dated October 15, 2021. The details are the sum of the public cemeteries with an area of 307 hectares, city parks with an area of 1,426 hectares, village parks with 352 hectares, urban forests with an area of 1,331, district parks with an area of 232 hectares, 40% of the planned area reclamation with an area of 116 ha, 30% of the road as a green line with an area of 334 ha, a local protected area with KDH 95% with an area of 489 ha (Local Regulation Medan City No. 1:22, 2022).

The Medan City District serves a number of critical spatial purposes as the central area of Medan City. The Medan Kota District, which serves as the city's centre, has a higher population density and rapid population expansion. More green open space is required in areas where there are more people. There is also an Exemplary area in this district, which is the present hub of athletic activities. As a result, research must be done to determine the area's sufficiency, appropriateness, predicted development demands, and management strategies. In accordance with the standards according to the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 14 of 2022. Concerning the Provision and Utilization of Green Open Spaces which is an update of the Law on Spatial Planning Number 26 of 2007, which in these standards is the availability public green open space must have 20% of the area and based on the Regulation of the Minister of Public Works Number: 05/PRT/M/2008.

As a result, it becomes crucial that there be green open space in this region that is distributed both spatially and proportionately. Analysis of green open space can be aided by the use of GIS and remote sensing. An analysis of green open space is required in order to maximize the planning and accessibility of green open space in urban areas due to the increasingly high population increase that results in land use change and makes the existence of green open space increasingly scarce.

The Great Mosque and Sri Deli Park are still present in Medan Kota District, which has become a built-up region but has a decreasing amount of natural land. This research is centered on this issue. The area of open space will decrease as the built-up area increases. The need for built-up space will rise as a result of the urbanization and population growth trends. By examining the projected trends in population and built-up areas, this condition may be forecast. This establishes the required minimum area for green infrastructure. The current open space, on the other hand, is a location that might be enhanced as a green infrastructure. An overview of the existing open space conditions will be acquired by determining the area's features.

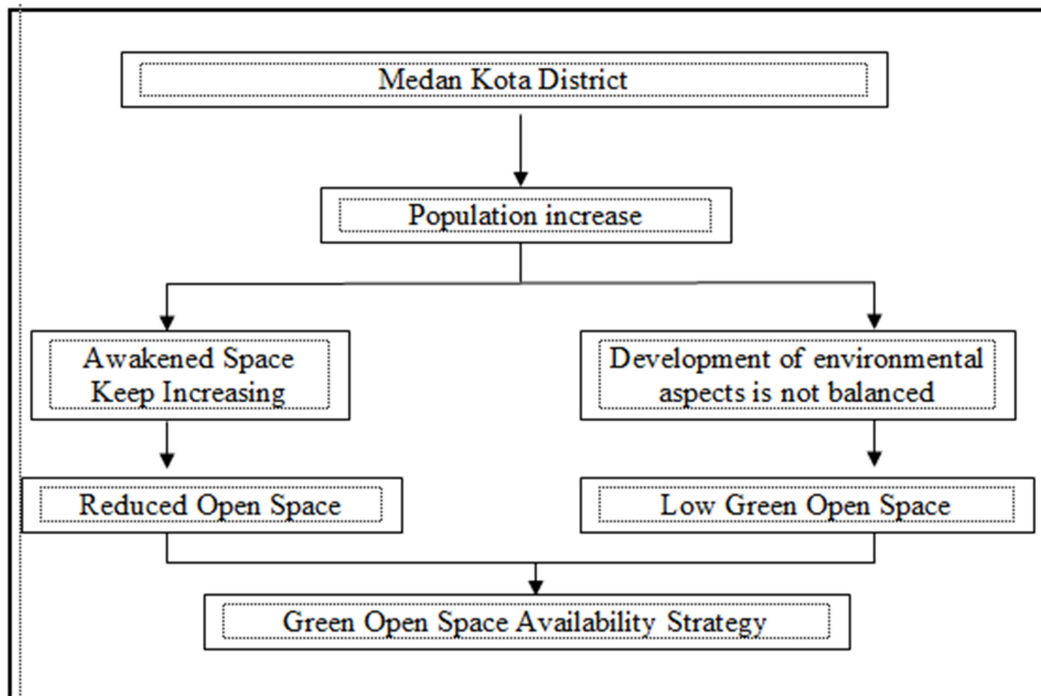


Figure 1. Research Thinking Framework

METODE

According to Moleong (2006), the sort of study performed is descriptive with a qualitative methodology. The four activity streams that make up this research are data gathering, data condensing, data presenting, and conclusion-drawing. The data collected for this study will be evaluated and interpreted using qualitative analysis of the data. In this study, the availability of green open space in the Medan Kota District is analyzed.

The research will be conducted in the Medan Kota District, which is the centre of Medan City and one of the methods to enhance population density and growth. The need for green open spaces increases with population density, but Medan Kota District also contains a number of cultural and heritage landscape features that the City of Medan heavily relies upon as city tourist attractions, including the Grand Mosque, Heroes Cemetery, and Sri Deli Park.

Cross-sectional data, which depicts a specific point in time, and time-series/periodic data, which describes something over time or over a specific period in a historical manner, are the two collections of data used in this study. The researcher used data from 2018 to 2021. The technique utilized in this work combines geographical analysis with mathematical applications to determine the extent of green open space needed annually and to locate existing green open spaces using a Geographic Information System (GIS). the population and the projection of the population made using the geometric formula for the projection of the population.

RESULTS AND DISCUSSION

Existence of Green Open Space in Medan Kota District

In the Medan Kota District, there is still a dearth of green open space. According to the findings of a research that compared the extent of green open space over a three-year period, the area has consistently declined. There were 130,754 hectares of green open space in the Medan Kota District in 2015, but there were 2,649 ha fewer in 2018. However, open green space increased in a number of urban communities. The highest area growth was in Pasar Merah Barat Village, which went from 15.953 ha to 15.166 ha.

Additionally, the Sei Rengas I Village's green open space area has shrunk to the point where there was none in 2018.

Additionally, there has been a decline in the proportion of green open space in the Medan Kota District between 2018 and 2021. In 2018, there was 128.105 hectares of green open space; in 2021, that number fell to 38.337 ha. The extent of green open space in the Sei Rengas Village increased to 0.735 hectares in 2021 from zero in 2018, when there was none. This is brought on by modifications in the Village's land usage. In contrast to 2018, when there were 0.744 acres of green open space in Pasar Baru Village, in 2021 there were none. In the community, land usage had changed. Comparison of green open space in 2015, 2018 and 2021 can be seen in Table 1 and Figure 2.

Table 1 Comparison of the Area of Green Open Space in each Village in 2015, 2018 and 2021

Village	Green Open Space (ha)		
	2015	2018	2021
Kota Matsum III	8,559	15,352	13,553
Mesjid	12,351	17,222	17,398
Pandau Hulu I	9,180	5,836	7,734
Pasar Baru	10,502	0,744	0
Pasar Merah Barat	15,953	31,069	17,060
Pusat Pasar	13,465	5,836	8,468
Sei Rengas I	10,298	0	0,735
Siti Rejo I	9,144	5,190	0,369
Sudi Rejo I	8,559	10,675	1,420
Sudi Rejo II	9,269	7,450	1,727
Teladan Barat	14,816	27,316	19,885
Teladan Timur	8,660	1,415	1,420
Total	130,754	128,105	89,768

Source: results of data analysis

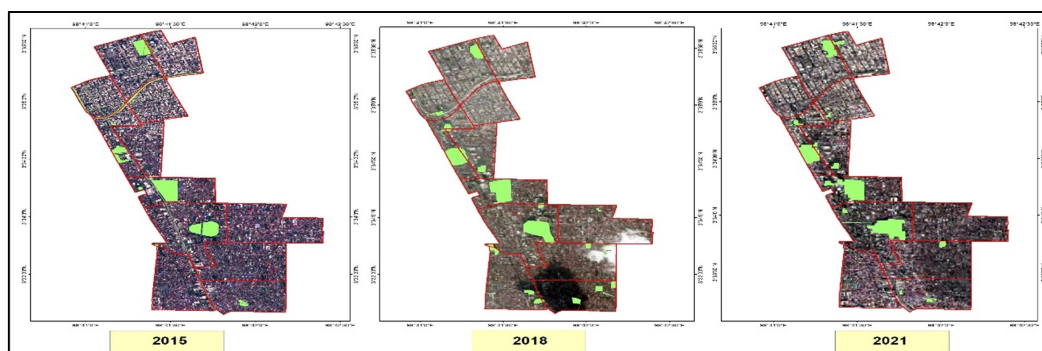


Figure 2. Map of the Existence of Green Open Spaces in Medan Kota District in 2015, 2018 and 2021

The existence of public open space in the Medan Kota District consists of a Public Cemetery (TPU), Village Park, Sports Field, City Park and Tourist Locations. The area of green open space in Medan Kota District can be seen in Table 2 and Figure 3.

Table 2. Types of Public Open Spaces in Medan Kota District

No.	Green Open Space	Village
1	Tourism Area	Mesjid
2	Sports field	Pasar Merah Barat

3	Village Park	Sitirejo 1
4	Village Park	Sudi Rejo 2
5	Village Park	Pusat Pasar
6	Village Park	Sei Rengas 1
7	Village Park	Teladan Timur
8	City Park	Teladan Barat
9	City Park	Mesjid
10	Public Cemetery Park	Pasar Merah Barat
11	Public Cemetery Park	Mesjid
12	Sports Field	Teladan Barat
13	Village Park	Teladan Barat
14	Village Park	Pasar Merah Barat
15	Village Park	Mesjid
16	Village Park	Kota Matsum 3
17	Public Cemetery Park	Sudi Rejo 2
18	Public Cemetery Park	Pusat Pasar

Source: results of data analysis

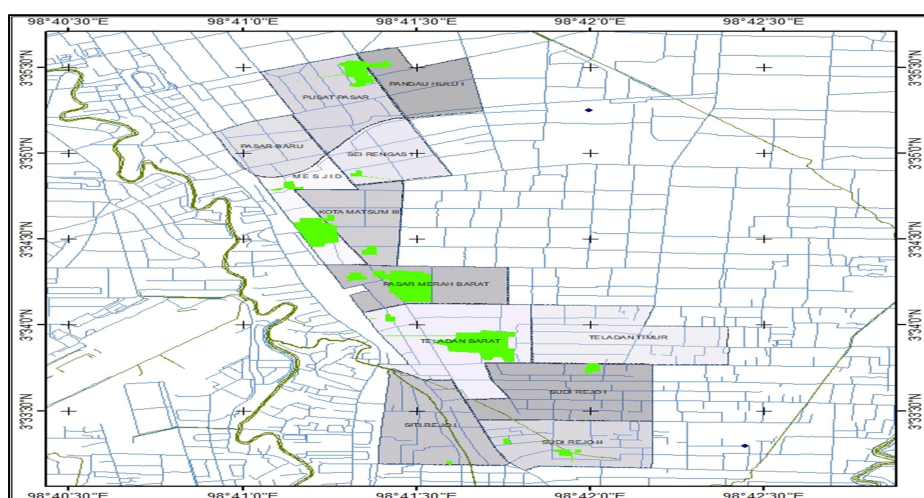


Figure 3. Map of Green Open Space in Medan Kota District

Public Green Open Space Based on Area in Medan Kota District

This analysis of public green open space based on the locality intends to determine if the accessibility of public green open space satisfies the requirements of the Republic of Indonesia's National Land Agency Regulation No. 14 of 2022. According to this guideline, public green open space must be available in 20% of the land under Spatial Planning Law No. 26 of 2007, which is a renewal of the Law Concerning the Provision and Utilization of Green Open Spaces. The area of the Medan Kota District is 598.068 acres. Administratively, it is divided into 12 Districts, with Teladan Barat District having the largest Village and Pasar Baru District having the smallest at 22,512 hectares. Table 3. illustrates the requirement for public green open space depending on the region in the Medan Kota District.

Table 3. Green Open Space Needs by Area

Village	Wide	The need for green	Existence of	Difference in	Information
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	(ha)	open space (ha)	green open space (ha)	green open space (ha)	
Kota Matsum III	31,820	6,364	13,553	7,189	Fulfil
Mesjid	27,151	5,430	17,398	11,968	Fulfil
Pandau Hulu I	35,258	7,052	7,734	0,683	Fulfil
Pasar Baru	22,512	4,502	0,000	-4,502	Not Fulfil
Pasar Merah Barat	32,558	6,512	17,060	10,548	Fulfil
Pusat Pasar	46,763	9,353	8,468	-0,884	Not Fulfil
Sei Rengas I	29,553	5,911	0,735	-5,176	Not Fulfil
Siti Rejo I	45,796	9,159	0,369	-8,791	Not Fulfil
Sudi Rejo I	89,173	17,835	1,420	-16,415	Not Fulfil
Sudi Rejo II	72,412	14,482	1,727	-12,756	Not Fulfil
Teladan Barat	97,722	19,544	19,885	0,340	Fulfil
Teladan Timur	67,350	13,470	1,420	-12,050	Not Fulfil
Total	598,069	119,614	89,768		

Source: Medan Kota District in Figures 2022 and analysis results

Five of the 12 districts in Medan Kota's district have adequate public green open spaces that meet the requirements of the National Land Agency of the Republic of Indonesia's Regulation No. 14 of 2022, which governs agrarian affairs and spatial planning. The size of public green open space in 2021 has only reached 89,768 ha, according to the findings of picture analysis, while the proportion of public green open spaces in Medan Kota District in 2021 is 119,614 ha distributed over 12 Districts. Zebua et al. (2020) said that the amount of public green open space in the Medan Polonia District is 140.88 Ha divided by the district's entire area, which is 901 Ha multiplied by 100%, or 15.63%. As a result, the public green open space in the Medan Polonia District now accounts for 15% of its entire area. 15% of the total area of the Medan Kota District is now made up of green open space in the Medan Kota District. Consequently, the 29,846 acres of public green open space in the Medan Kota District are still insufficient.

If this problem is not treated, it can lead to a decline in the quality of the environment, including the air and clean water, which can have an impact on health. According to Siregar (2016), green open space serves a variety of purposes, including preserving the environment's quality, fostering fresh air and beauty, acting as the city's lungs, protecting freshwater sources from erosion, and serving as a teaching tool. Figure 4. displays a map of the district of Medan Kota's enough green space.

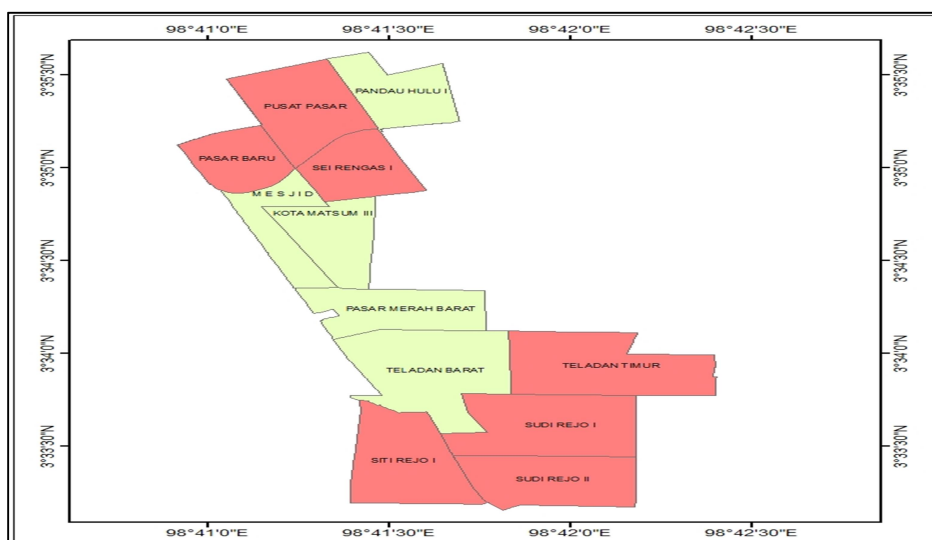


Figure 4. Map of Adequacy of Open Space Based on Area

Green Open Space Based on Total Population

The Minister of Public Works Regulation Number: 05/PRT/M/2008 governs how much green open space is required based on population. Based on population, the typical amount of green space needed is 20 m²/person. To estimate the demand for green open spaces and to assess the sufficiency and lack of current green open spaces in the next years, the requirement for green open spaces is identified in relation to population increase (Mahardika et al., 2015).

Year after year, the population of the Medan Kota District has grown. In 2021, there will be 87,725 inhabitants living in the 12 districts that make up the Medan Kota District. The number of inhabitants and activity participants in the Medan Kota District area are not included in the calculation of the requirement for Green Open Space based on population, which only considers the population of the study location. The amount of Green Open Space necessary in each village, as per the Minister of Public Works Regulation Number: 05/PRT/M/2008, is shown in Table 4.

Table 4. Number of Population and Green Open Space Needs

Village	Wide (ha)	The need for green open space (ha)	Existence of green open space (ha)	Difference in green open space (ha)	Luas (ha)
Kota Matsum III	6.578	0,033	13,553	13,520	Fulfil
Mesjid	4.214	0,021	17,398	17,377	Fulfil
Pandau Hulu I	5.338	0,027	7,734	7,708	Fulfil
Pasar Baru	3.698	0,018	0,000	-0,018	Not Fulfil
Pasar Merah Barat	3.923	0,020	17,060	17,040	Fulfil
Pusat Pasar	4.405	0,022	8,468	8,446	Fulfil
Sei Rengas I	5.418	0,027	0,735	0,708	Fulfil
Siti Rejo I	9.000	0,045	0,369	0,324	Fulfil
Sudi Rejo I	15.272	0,076	1,420	1,343	Fulfil
Sudi Rejo II	10.410	0,052	1,727	1,675	Fulfil
Teladan Barat	8.899	0,044	19,885	19,840	Fulfil
Teladan Timur	10.570	0,053	1,420	1,367	Fulfil
Total	87.725	0,439	89,768		

Source: Medan Kota District in Figures 2022 and analysis results

In general, the population's need for green open space has been met, however the distribution of green open space in the Medan Kota District has not been uniform. The Sudi Rejo I Village, with a population of 15,272 people, has the largest requirement for green open space, and as determined by the number of residents in each district in the Medan Kota District, the necessary green open space is 0.076 hectares. With a population of 3,698 people, Pasar Baru Village has the lowest need for green open space; however, there won't be any green open space there in 2021, necessitating a change in land use to meet the demand for green open space in the Pasar Baru Village. According to Dianovita and Siwi's (2019) prediction, the demand for built-up land will be impacted by the annual rise in population. Due to this, open ground is converted into built-up land that is home to towns, businesses, and other infrastructural amenities.

More land is required for settlements, public amenities, and infrastructure to satisfy community demands the more densely populated a region is. More acreage will be required as population density increases. This may lead to the development of towns, public amenities, and public infrastructure in these places' green open spaces. The amount of green open space in relation to population is seen in Figure 5.

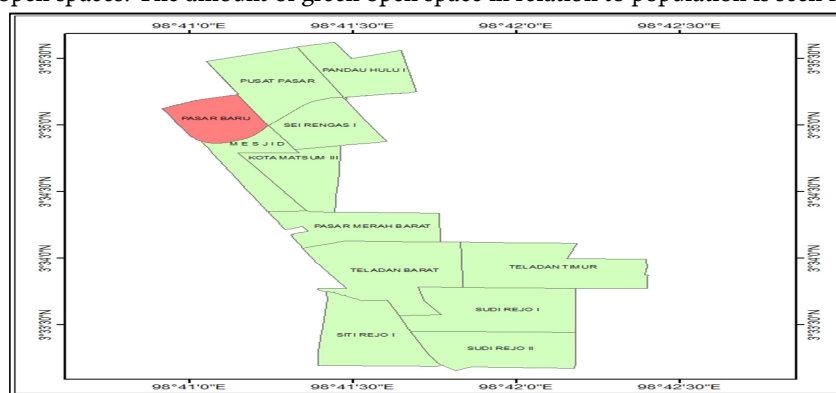


Figure 5. Map of Adequacy of Green Open Space based on population in 2021

Spatial management policy directions in order to fulfill Green Open Spaces

A city's green open space is a crucial component. In order to maintain a balance between ecosystems and development in the contemporary period, green open space serves to balance the ecological condition in a given region. Cities have a limited amount of land, but there is a growing need for urban land use to build a variety of urban services, such as communities, industries, and more transit lines, which will gradually encroach on land or other open spaces in urban regions.

There are two reasons why green open area turns into developed property. First, as residential and industrial areas grow, it makes locations more accessible for housing and business growth. This encourages a rise in the demand for land from investors and land speculators, which raises the cost of the surrounding land. Second, a rise in property values may encourage further locals to sell their land. As non-residents frequently own land, gantry lands are created, which are more susceptible to land conversion (Ardiansah and Oktapani 2019). Table 5 lists the villages in the Medan Kota District that still don't have enough green space.

Table 5. Districts That do Not Fulfill Sufficient Green Open Space

Village	Existence of green open		Information
	space (ha)	Disadvantages (ha)	
Pasar Baru	0,000	4,502	Not Fulfil
Pusat Pasar	8,468	0,884	Not Fulfil
Sei Rengas I	0,735	5,176	Not Fulfil
Siti Rejo I	0,369	8,791	Not Fulfil

Sudi Rejo I	1,420	16,415	Not Fulfil
Sudi Rejo II	1,727	12,756	Not Fulfil
Teladan Timur	1,420	12,050	Not Fulfil
Total	89,768		

Source: Results of data analysis

According to the analysis's findings, seven urban towns do not have enough green space relative to their size. This ratio must be maintained if the overall area of the green open space is already greater than the limits imposed by the relevant rules or legislation. However, according to the findings of a study done in the Medan Kota District, green open spaces still fall short of the minimum requirement of 20% of the territory set by the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 14 of 2022. Therefore, guidelines for managing green open spaces are required.

After making an effort to create new green open spaces in the Medan Kota District, it was discovered that a number of areas in the Medan Kota District had promise for the creation or addition of green open space. Land acquisition and the use of already-existing green open spaces can be done in addition to serving the purpose of a green open space. A city's availability of green open places, such as city parks, green belts, and others, is not only due to the efforts of the government. However, private property owned by the community or the private sector may also be used to provide green open space. Existence of residential green open spaces is one way the community may contribute to the creation of urban green spaces. both via the creation of environmental parks and the landscaping of yards. Green open spaces may serve a number of purposes in settlements, particularly urban ones, including aesthetic, sociocultural, hydrological, climatological, and defensive ones. Figure 6. shows that the suggested locations in the Medan Kota District have the potential to be used for the creation or extension of green open space.

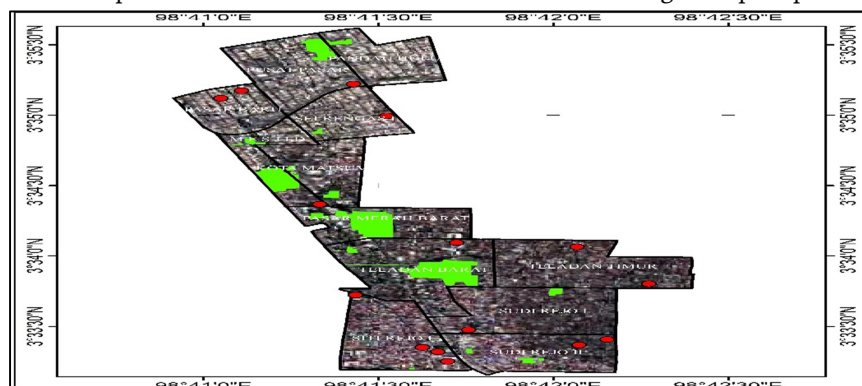


Figure 6. Directional Map of Green Open Space Management in Medan Kota District

Location recommendations that have the potential to be utilized in the formation of new green open spaces are found in 9 districts, namely Pasar Baru district, Pusat Pasar, Sei Rengas I, Siti Rejo I, Sudi Rejo I, Sudi Rejo II, West Exemplar, East Exemplar and Mosque. Location recommendations are obtained from taking points from Google Earth. Green open space development can be carried out by empowering office areas, housing, houses of worship, schools, universities and sports fields to become vegetated areas (Ardani and Hanafi, 2013).

Through agreements or cooperative efforts with the regional government, communities can take part in the provision of public green open space for a portion of the property they own. Public green open space can be provided using resources that are within the jurisdiction of the federal or provincial governments. Public input is gathered during the Spatial Planning preparation process in order to provide Public Green open spaces. The following methods are used to fulfill the need for green open space in urban areas: land purchase and/or acquisition, management, land leasing, community collaboration, and/or

enhancing the quantity and quality of green open space. the installation of nearby flora that satisfies the requirements for green open space landscapes in structures that serve as shady areas, sound absorbers, odor filters, dust filters, and/or urban farms.

By planting vegetation with different stratifications (trees, shrubs, herbs, shrubs, ground cover plants), providing circulation pathways in the form of porous pavement (porous concrete, porous paving, grassblock, and others), and providing socio-cultural functions in the form of sports and health facilities, recreational facilities, roofed spaces/gazebos, and landscape furnishings to support, one can fulfill the need for green open space.

Green open space must be taken into consideration as a crucial component of building arrangement activities in order to improve the quality of urban space and attempts to improve the function of places in urban settings. The rationale is that settlements' environmental and construction features are inseparable parts, supporting one another in a balanced, harmonic manner. Despite its high pace of population increase, the city seeks to retain the quality of its urban environment.

CONCLUSION

The availability of Green Open Space in Medan Kota District in 2015 is known to be 130,754 ha. Within 3 years there has been a change in the area of green open space in Medan Kota District. In 2018 the area of green open space in the Medan Kota District was 128.105 ha which consisted of sports fields, village parks, tourist areas, city parks and public cemeteries. The area of green open space in Medan Kota District in 2021 is 89,768 ha. The availability of green open space in the Medan Kota District has decreased over the past 3 years. The distribution of green open space in Medan Kota District is not evenly distributed throughout the Village.

The adequacy of green open space is based on the area that refers to the standards set by the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 14 of 2022. The area of Medan Kota District is 598.068 ha. Based on the results of the analysis that has been carried out, the area of green open space in Medan Kota District has not met the provision standards based on area size. Of the 20% standard, Medan Kota District only has 89,768 ha or still lacks 29,846 ha.

The projection of the need for green open space is based on the population determined based on the Regulation of the Minister of Public Works Number: 05/PRT/M/2008. The population of Medan Kota District in 2021 is 87,725 people spread over 12 districts. Based on the results of the analysis that has been carried out, the area of green open space in the Medan Kota District based on the population has been fulfilled. However, the distribution is not evenly distributed, in the Pasar Baru Village there is still a lack of green open space of 0.018 ha.

The directive to fulfill a minimum area of 20% green open space from the total area can be carried out by the mechanism of: purchasing and/or land acquisition; management; land lease; cooperation with the community; and/or increasing the quantity and quality of green open space. Planting local vegetation that meets the technical criteria for green open space landscapes in buildings that function as shade, sound absorbers, odor filters, dust filters, and/or urban agriculture.

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