

LAND USE CHANGE REGARDING SPATIAL PLANNING IN MEDAN TUNTUNGAN DISTRICT

Indri Meiyanti¹, Abdi Sugiarto²

¹Mahasiswa Program Studi Perencanaan Wilayah dan Kota, Universitas Pembangunan Panca Budi, Medan

²Staf Pengajar di Program Studi Perencanaan Wilayah dan Kota, Universitas Pembangunan Panca Budi, Medan

*Koresponden email: abdi_sugiarto@dosen.pancabudi.ac.id

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Abstract

Population growth, improving quality of life, and community welfare increase the need for land. The fixed amount of land triggers land use problems in rural and urban areas. Land use changes are significant in several areas in Indonesia, where these changes are often not in accordance with spatial plans. Spatial planning policies such as the Medan City RDTR Perda affect the dynamics of land use and require review along with changes in the strategic environment. The purpose of this study is to identify and analyze the types of land use that have developed in Medan Tuntungan District during the implementation period of the Medan City RDTR policy regulations and analyze the suitability and non-suitability of land use to the Medan City RDTR zoning plan. This study is a descriptive-qualitative study using a geospatial analysis approach based on geographic information systems with overlay operations techniques in comparisons between spatial objects. The results of this study indicate that existing land use in 2015 in Medan Tuntungan District was dominated by non-built-up land covering an area of 2,077.07 hectares (72.38%) in most of the shrubs, fields, and plantations. Furthermore, in 2023 it was still dominated by non-built-up land covering an area of 1,770.93 hectares (61.71%), where in the eight-year period there was a significant change in land use covering an area of 695.23 hectares (23.23%). The dynamics of land use changes occurred in the conversion of non-built-up land to built-up land which decreased by -306.14 hectares (-10.67%), especially in rice fields (-110.75 hectares), fields (-134.68 hectares) and plantations (-77.78 hectares). The land changes were mostly converted into settlements, trade, and public service facilities, so it can be stated that there was a decrease in the function of productive agricultural land to built-up land in Medan Tuntungan District. In the suitability of land use in 2015 with the RDTR plan at the beginning of the RDTR planning year, it still had an implementation performance of 770.79 hectares or 26.86% as land use in accordance with the RDTR and had been realized. Then in 2023 there was an increase in implementation performance of 1,021.94 hectares or 35.61%. Meanwhile, the suitability of land use with the RDTR plan from changes in land use that occurred within eight years (2015-2023) includes 612.62 hectares (88.12%) that are in accordance with the RDTR directives and 82.60 hectares (11.88%) that are not in accordance with the RDTR directives. This shows that supervision of land conversion in protected areas, acceleration of the development of planned public service facilities, and re-evaluation of several zones that have not developed as expected are still needed.

Keywords: *Land Change, Spatial Planning Suitability, Medan City.*

1. Introduction

Population growth creates a need for residential, commercial, and infrastructure land, which often results in the conversion of agricultural land to urban areas. The expansion of infrastructure and public facilities requires new land, changing the land cover of the area. Spatial planning and development policies by local governments influence land use through urban development, agricultural land development, and protected area planning. Population growth causes an increase in residential areas (Sagala, 2024). Significant changes in land use/cover are increasing built-up land, this can occur due to massive development by the government, both central and local governments. The central government builds infrastructure that results in very significant use/cover, coupled with better access to the provincial capital, resulting in the conversion of land into built-up land being unavoidable (Ardhiatma et al. 2020).

Addition population, increasing quality of life, and community welfare have implications for increasing various needs and facilities, all of which require land. Meanwhile, the amount of land is relatively fixed, so it often causes

problems in the use of land in rural and urban areas. When the population is still relatively small, land use for various purposes can still be done simply by selecting suitable land for a particular use that is needed. On the other hand, when the population is large with various needs according to the demands of the times, land allocation is no longer possible to be done traditionally, so it needs to be done rationally through land resource evaluation activities and continued with land use planning. This is important so that the limited amount of land can be optimized for use in a rational way, most in accordance with the nature and main characteristics of the land and in accordance with the needs of the community. Land allocation (space) in addition to considering land suitability and land availability is also an art to be able to meet various types of stakeholder needs, both government, community and business / private (Sitorus, 2016).

Land use is a variety of information or data needed in relation to the inventory of current land use, including location, accessibility, ownership, zoning, government policy, and population perception. Various aspects related to socio-economic data such as value, land rent, taxes, transportation costs, social costs, capital costs, and attitudes, are important to know before choosing a particular land use and in changing from one form of land use to another. Likewise, information about previous land use is also important in land use dynamics. The speed of change, type of change and reasons for land use modification can be input to understanding the problems and issues faced by land use analysts (Sitorus, 2016). According to (2018) land use consists of eight types, namely forests, mixed gardens, fields, built-up land, open land, rice fields, bushes and water bodies.

Based on previous research in research (Saifuddin and Danardono, 2024) stated that in Boyolali Regency there was a change in land use in the 11-year period (2011-2022) of 210.74 km² (19%), with the suitability of land use in 2022 to the spatial pattern of the Boyolali Regency Spatial Plan (RTRW) in 2011 in the appropriate class covering an area of 797.24 km² (73%) and the unsuitable class covering an area of 297.15 km² (27%). Research (2022) stated that in Syamtalira Aron District, North Aceh Regency, there was a discrepancy of 212.36 Ha (10%) and a conformity of 1908.84 Ha (90%) in the 2012 North Aceh Regency RTRW. Research (Anisa Ika Marlina, et al. 2022) stated that in Baturraden District, Banyumas Regency, there was a discrepancy of 1737.57 Ha (38.18%) and a conformity of 2813.18 Ha (61.81%) in the 2011 Banyumas Regency RTRW. Research (2018) stated that in the 2011 Sumedang Regency RTRW there were 25 types of land use deviations and the most dominant were deviations into rice fields (18,364 ha), fields (8,405 ha) and built-up land (7,741 ha). Furthermore, research (Mr. Pratono and Rahmad Dian Sembiring, 2018) stated that changes in land use from 2003 to 2018 in Medan Tembung District, Medan City were dominated by the development of trade and service activities which reached 87.17 Ha in 2003, then increased to 103.13 Ha in 2018. Meanwhile, the conformity with the Medan City RTRW in 2011 was 540.59 Ha (69.61%) and the non-conformity was 236 Ha (30.39%).

The phenomenon of the urban fringe in Medan City has experienced very rapid development with the pressure of urbanization resulting in the conversion of undeveloped land into housing or commercial, social and economic changes that create infrastructure and public service challenges, environmental degradation, congestion and transportation problems. In addition, there are licensing conflicts in spatial planning due to changes in land use that are often not properly regulated, resulting in inefficient land use and conflicts of interest. From these problems, the questions that can be put forward as research problem formulations are:

1. What are the types and distribution of land use that have developed over a period of 8 years (2015-2023) in Medan Tuntungan District since the issuance of the Medan City RDTR policy regulation?
2. Are changes in land use in Medan Tuntungan District in accordance with the Medan City RDTR policy directions?

Based on conditions that have been mentioned, it is necessary to conduct an analysis of land changes and their suitability to the zoning plan stipulated in the Medan City RDTR to identify and analyze the types and distribution of land use types that have developed in Medan Tuntungan District during the implementation period of the Medan City RDTR policy regulations, and analyze the suitability and non-suitability of land use to the Medan City RDTR zoning plan.

2. Literature Review

Regional Regulation City Medan Number 2 of 2015 concerning the Detailed Spatial Plan (RDTR) of Medan City for 2015-2035 states that the Urban Area Section (BWP) of Medan Tuntungan has the goal of spatial planning as a center for trade/business activities and an education center. This is in accordance with Medan City Regulation Number 1 of 2022 concerning the Regional Spatial Plan (RTRW) of Medan City for 2022-2042 which establishes Medan Tuntungan District as a Sub City Service Center (SPPK) which functions as a center for trade/business activities, a health service center, and an education center. The existence of this spatial planning policy will create dynamics of land changes that will occur in the future. In addition, the Medan City RDTR policy has been running for 8 (eight) years, which means it has entered a review period (revision). In addition, the determination of the

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administrative boundaries of Medan City at the city limits and sub-district boundaries is definitively a strategic environmental change that requires a revision of the Medan City RDTR.

In Medan City, residential areas continue to increase. Within a period of 13 years (1989-2002) there was an increase in settlements of 42%, where in 1989 an area of 8,456 Ha became 199.50 km² in 1989 which shows that the level of need of Medan city residents for residential space is increasing (Lumbatoruan, 2010). Then according to (Sipayung et al. 2020), the residential area experienced an increase again in the period 2007-2012 covering an area of 1,665.07 Ha and 5 years later (2012-2018) there was another increase in residential land covering an area of 954.20 Ha with the direction of physical development of the area heading to the South of Medan City due to urbanization and its proximity to the city center. Meanwhile, according to (Matondang et al. 2023), the prediction of the development of built-up areas in the 20-year period (2021-2041) in Medan City tends to be rapid in the development of residential areas, namely the addition of residential areas of 800 Ha. Where in 2021 the residential area is 17,698 Ha and in 2041 the residential area is 17,698 Ha.

In Subdistrict Medan Tuntungan according to (Laia et al, 2023), has land capacity for residential development in the very high land capacity class, which is 1,665.59 Ha (61.6%) and land capacity in the high class is 432.03 Ha (16%). This shows that Medan Tuntungan District has the dominant potential for developing residential areas covering an area of 2,097.62 Ha or 77.6% of its area with existing conditions in 2022 there are 786.2 Ha (29%) of potential land that has not been built as a residential area.

The occurrence changes and conversion of non-built-up land in Medan City resulted in there is an increase in the level of critical land in a period of 25 years (1989-2014), where in 1989 the critical land area was 0.45 Ha (0.0002221%) and increased in 2014 to 562.95 Ha (0.277188%) which indicates the need for reforestation (Tampubolon and Yanti, 2015). Likewise, food reserves, especially rice in Medan city, still have to be imported from other areas/regions, because the amount of harvest in Medan city is very disproportionate to the population of Medan city (Abdina et al. 2023).

Implementation controlling the conversion of agricultural land into non-agricultural land which carried out by the government through laws and regulations has not provided a sense of justice for the community because the regulations are not clear and firm which results in multiple interpretations in their implementation. No matter how good a regulation is made without understanding in its implementation and without knowing the regulation, the regulation is only good on paper, this is the main weakness of controlling the conversion of agricultural land to non-agricultural land. The government continues to strive to issue laws and regulations to control the conversion of agricultural land to non-agricultural land, but socialization of these regulations is lacking so that public understanding of these regulations is non-existent (Rahmanto, 2022).

3. Method

Research Area

The research area is Medan Tuntungan District which includes 9 urban villages, namely Namu Gajah, Simpang Selayang, Mangga, Sido Mulyo, Lau Cih, Tanjung Selamat, Baru Ladang Bambu, Kemenangan Tani, and Simalingkar. The boundaries of Medan Tuntungan District used in this study are the boundaries of the districts in the Medan City RDTR with an area of ± 2,869 Ha. The map of the research area is presented in Figure 1.

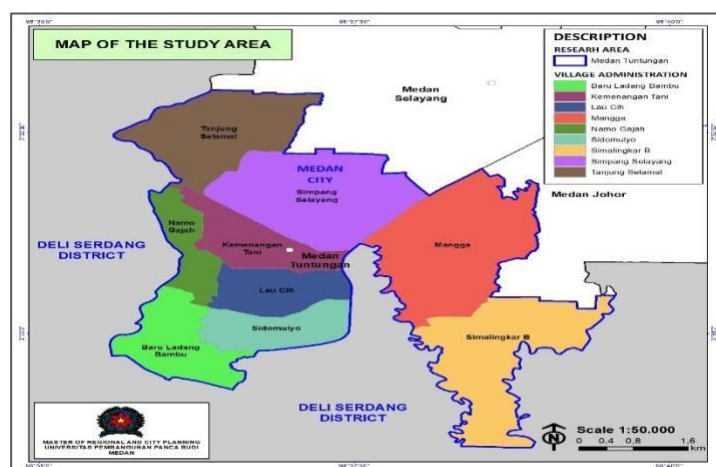


Figure 1. Research Area Map

Research Approach

This research refers to the general strategies or methods used in collecting and analyzing research data (2020). This study is a descriptive-qualitative study using a geospatial analysis approach based on geographic information systems to conduct spatial analysis of land use changes against the RDTR spatial pattern plan which is also spatially based. The selection of this geospatial analysis approach is to directly compare the Medan City RDTR regulations which are outlined in the form of spatial maps of spatial pattern plans with spatial maps of land use, so that the overlapping/overlapping of spatial pattern plans per land use can be identified spatially in Medan Tuntungan District. The existence of this overlap will provide information on the suitability of land use to the Medan City RDTR.

The overlay operation technique is used to see comparisons between spatial objects, so that the comparative data can be grouped into a research conclusion.

Data collection

Data collection is the process of obtaining information needed in conducting research. This process involves collecting, recording, and documenting data from various sources. The types of data used in this study are secondary data obtained from related agencies, including:

1. Material Technical and the Medan City RDTR Database 2015-2035 from the Medan City Housing, Residential Areas, Public Works and Spatial Planning Service.
2. Aerial photos from 2015 were obtained from the Department of Housing, Residential Areas, Public Works and Spatial Planning of Medan City.
3. Pleiades Satellite Imagery in 2023 was obtained from the Medan City Housing, Residential Areas, Public Works and Spatial Planning Service.

Data Analysis Techniques

The data analysis used in this study is a geospatial analysis based on geographic information systems using the ArcGIS application. This geospatial analysis begins with the creation of a land use map in 2015 and a land use map in 2023 in Medan Tuntungan District. The existence of this existing land use map data is as input in conducting further analysis. The next analysis is the analysis of the dynamics of changes in land use in the period 2015-2023, analysis of the suitability of land use in 2015 to the Medan City RDTR spatial pattern plan in 2015, analysis of the suitability of land use in 2023 to the Medan City RDTR spatial pattern plan in 2015, and analysis of the suitability of land use changes to the Medan City RDTR spatial pattern plan in 2015 in Medan Tuntungan District.

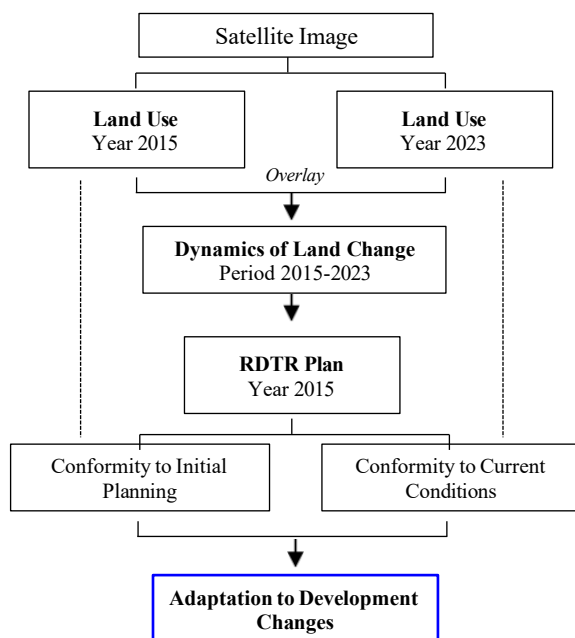


Figure 2. Research Flow Diagram

1. Identification of Existing Land Use Maps

This land use identification is carried out by digitizing (interpreting) the type of land use in the appearance of aerial photos in 2015 and satellite images in 2023 in the form of vertical and high-resolution satellite images. Digitization uses manual interpretation of the appearance of satellite images on the monitor screen (on-screen

digitation) to obtain a more detailed delineation of land use on existing land plots and facilitate the identification of the type of expected land use, so that it can be compared with the RDTR mapping scale at a scale of 1: 5,000.

Land use classification is limited to the operational definition of the author's understanding which is adjusted to the operational definition in the classification of types of spatial plan patterns of Medan City RDTR to facilitate the description of land use comparisons in further analysis. Types of land use are grouped into land openness types, namely as open land and built-up land to determine the proportion of land openness in the research area.

2. *Land Use Change Dynamics Analysis 2015-2023*

The analysis of the dynamics of land use changes from 2015 to 2023 aims to see the development of the research area from the beginning of the establishment of the Medan City RDTR policy in 2015 to 2023. The results of the spatial data overlay will be tabulated in the form of a land use change transition matrix that detects changes in one type of land use to another land use and land use that has not changed from 2015 to 2023. From this matrix, the dynamics of land use changes from 2015 to 2023 can be concluded.

Land use development is seen from the dominant land use that has changed over a period of 8 (eight) years. To see the development of a land use, the development calculation is carried out using the following formula:

$$P = (YX)/X*100\%$$

Information :

P: percentage of development of a land use

X : value in 2015

Y : value in 2023

After obtaining the results of the development of dominant land use changes in the research area, the development percentage can then be tabulated and described.

3. *Analysis of Land Use Suitability in 2015 Against the Medan City RDTR Spatial Plan in 2015*

The analysis of land use suitability in 2015 against the 2015 Medan City RDTR spatial pattern plan aims to determine the performance or quality of the RDTR spatial zoning planning against existing conditions at the beginning of the planning year. This analysis was carried out by overlaying data from the interpretation of land use in 2015 and data from the 2015 Medan City RDTR spatial pattern plan in the study area.

The results of the spatial data overlay will be tabulated in the form of a land use suitability transition matrix in 2015 to determine the suitability and unsuitability of land use. Land use suitability is categorized based on the approach of identifying the realization of the plan in existing conditions without looking at the activity zoning rules due to limitations in understanding the complexity of activities in current regulations. The assessment criteria are based on general understanding and the author's understanding of the licensing/approval process for space in Medan City.

The 2015 land use suitability classes with their assessment criteria consist of 4 (four) suitability classes which are explained as follows:

1. **Appropriate (Already Realized)**, namely for the meeting of land use types in 2015 with the 2015 RDTR spatial pattern plan that has been realized with land use that is in accordance with the spatial pattern plan (utilization according to plan/has been realized).
2. **As per (Not Yet Realized)**, namely for the meeting of land use types in 2015 with the 2015 RDTR spatial pattern plan which has not been realized with land use in the form of open land (not yet built) which is planned as a cultivation spatial pattern plan (utilization has not yet been realized).
3. **Not Appropriate (Utilization)**, namely the meeting of the types of land use in 2015 with the 2015 RDTR spatial pattern plan which is not in accordance, both those which have been realized and those which have not been realized.
4. **Not Suitable (Mapping Technique)**, namely the meeting of the type of land use in 2015 with the 2015 RDTR spatial pattern plan which is identified as an outlier polygon (sliver) as a result of the difference in accuracy between the depiction of land use in 2015 and the depiction of the 2015 RDTR spatial pattern plan. This is often referred to as parallax error (human error) with a mapping error threshold (gallat error) and usually has an insignificant proportion of the research area.

4. *Analysis of Land Use Suitability in 2023 Against the 2015 RDTR Spatial Pattern Plan*

The analysis of the suitability of land use in 2023 against the 2015 Medan City RDTR spatial pattern plan aims to determine the realization of RDTR spatial zoning planning against current existing conditions that are represented in land use in 2023. The results of spatial data overlay will be tabulated in the form of a land use suitability transition

matrix in 2023 to determine the suitability and unsuitability of land use. The land use suitability category in this analysis is the same as the previous analysis with 4 (four) suitability classes, namely:

1. In accordance(AlreadyCome true),
2. In accordance(Not Yet Realized),
3. Not Appropriate (Utilization),
4. NoAppropriate (Mapping Technique).

5. *Analysis of Suitability of Land Use Changes (2015-2023) Against the 2015 RDTR Spatial Pattern Plan*

Analysis of the suitability of land use changes within a period of 8 years (2015-2023) to the 2015 Medan City RDTR spatial pattern plan aims to see the quality of spatial realization in the changes in land use that occur and assess whether or not the changes in land use are in accordance with the RDTR spatial zoning plan. This analysis is carried out by overlaying data from the analysis of land use that has changed (2015-2023) and data from the 2015 Medan City RDTR spatial pattern plan in the research area.

The results of the spatial data overlay will be tabulated in the form of a land use change suitability transition matrix (2015-2023). The land use change suitability categories in this analysis are grouped into 2 (two) suitability classes, namely:

1. In accordance with RDTR Directives, and
2. Not in accordance with RDTR directives.

4. Results and Discussion

Identification of Existing Land Use

1. *Land Use in Medan Tuntungan District in 2015*

Land use in 2015 in Medan Tuntungan District includes various categories, both non-built-up land (open land) and built-up land. Open land dominates with an area of 2,076.47 hectares or around 72.38% of the total study area. From this category, shrubs have the largest area, namely 713.10 hectares (24.85%), followed by fields covering 656.66 hectares (22.88%), plantations covering 380.70 hectares (13.27%), and rice fields covering 146.85 hectares (5.12%). Meanwhile, parks, water bodies, urban forests, cemeteries, and fish ponds each have smaller areas, with percentages ranging from 0.34% to 2.56%.

Meanwhile, built-up land covers 793.11 hectares or 27.62% of the total area. Residential is the largest category of built-up land with an area of 616.31 hectares (21.48%). Followed by trade and services covering 55.83 hectares (1.95%), public service facilities covering 54.12 hectares (1.89%), and roads covering 52.99 hectares (1.85%). Land used for warehousing, offices, and defense and security has a smaller area, ranging from 0.01% to 0.29%.

From this data, it can be seen that most of Medan Tuntungan District is still non-built-up (open land), especially in the form of bushes and fields, while built-up land is dominated by residential areas. so it is concluded that Medan Tuntungan District in 2015 has a dominant use of existing land as agricultural land. The results of the identification of existing land use in 2015 can be seen in Table 1.

Table 1. Identification of Land Use in 2015

No	Land Use in 2015	Built-up Area	Area (Ha)	%
1	Water Body	Non Awakened	66.51	2.32%
2	City Forest	Non Awakened	19.38	0.68%
3	Park	Non Awakened	73.60	2.56%
4	Burial	Non Awakened	10.61	0.37%
5	Shrubs	Non Awakened	713.10	24.85%
6	Plantation	Non Awakened	380.70	13.27%
7	Field	Non Awakened	656.66	22.88%
8	Ricefield	Non Awakened	146.85	5.12%
9	Fish pond	Non Awakened	9.66	0.34%
10	Road Body	Awake	52.99	1.85%
11	Settlement	Awake	616.31	21.48%
12	Public Service Facilities	Awake	54.12	1.89%
13	Office	Awake	4.76	0.17%
14	Defense and Security	Awake	0.32	0.01%
15	Trade and Services	Awake	55.83	1.95%
16	Warehousing	Awake	8.19	0.29%
Total (Ha)			2,869.58	100.00%

Source: Results of Aerial Photo Interpretation Analysis 2015

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Shrubs are the largest land use with an area of 713.10 hectares, spread across almost all sub-districts, especially in Mangga Sub-district (221.28 ha), Tanjung Selamat Sub-district (97.04 ha), and Simalingkar B Sub-district (91.32 ha). In addition, cultivated land including plantations and agriculture covers an area of 656.66 hectares, with the highest concentration in Simalingkar B Sub-district (196.04 ha), Simpang Selayang Sub-district (135.39 ha), and Kemenangan Tani Sub-district (58.25 ha). Settlements are also a significant land use, reaching 616.31 hectares, dominated by Mangga Sub-district (166.35 ha), Simpang Selayang Sub-district (162.70 ha), and Tanjung Selamat Sub-district (107.78 ha).

Mangga Village has the largest land area (563.14 ha) dominated by settlements, bushes, and city parks. Simpang Selayang Village (492.96 ha) and Simalingkar B Village (478.29 ha) also have large land areas with the main use for settlements and fields. Tanjung Selamat Village (383.97 ha) is dominated by bushes and settlements, while Baru Ladang Bambu Village (244.18 ha) and Kemenangan Tani Village (199.51 ha) have a more balanced distribution between fields and bushes. Villages with smaller land areas, such as Namu Gajah Village (140.31 ha) and Sidomulyo Village (185.05 ha), tend to be used more for settlements, parks, and public service facilities.

Overall, the land use pattern in Medan Tuntungan District shows that some sub-districts are developing as residential centers, while others still maintain their proportion of area for agriculture. Distribution of land use in 2015 per sub-district can be seen in Figure 3 and the visual map of land use can be seen in Figure 4.

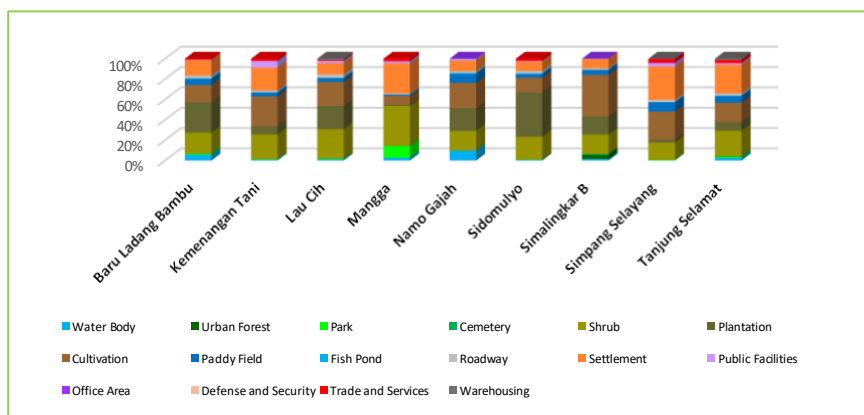


Figure 3. Distribution Land Use in 2015 Per Sub-District

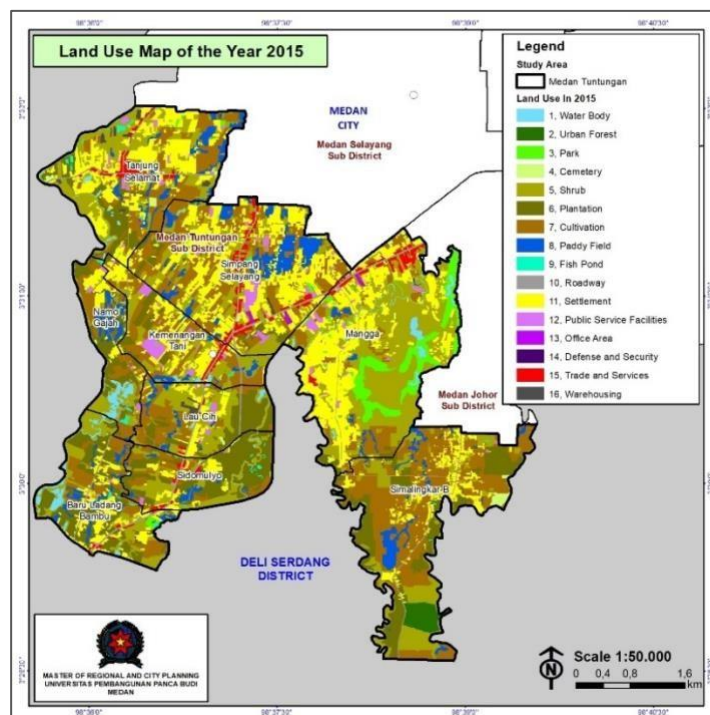


Figure 4. Existing Land Use Map 2015

2. Land Use in Medan Tuntungan District in 2023

In 2023, land use in Medan Tuntungan District is still dominated by non-built-up land (open land) with an area of 1,771.92 hectares or around 61.78% of the total study area. Shrubs are the largest category of non-built-up land with an area of 733.40 hectares (25.56%), followed by cultivated land with an area of 521.98 hectares (18.19%) and plantations with an area of 302.92 hectares (10.56%). City parks cover an area of 74.06 hectares (2.58%), while cemeteries cover 18.93 hectares (0.66%). Rice fields have a smaller portion with an area of 36.09 hectares (1.26%), followed by fish ponds with 8.76 hectares (0.31%).

Meanwhile, built-up land covers 1,097.66 hectares or 38.22% of the total area. Residential areas are the largest category of built-up land with an area of 850.69 hectares (29.65%). Other categories include trade and services with an area of 108.73 hectares (3.79%), public facilities covering 71.17 hectares (2.48%), and road networks covering 52.99 hectares (1.85%). Offices, warehouses, and defense and security land have smaller areas, with percentages ranging from 0.01% to 0.32%.

These data show that open land is still the largest part of land use, dominated by shrubs and fields. On the other hand, built-up land also has a fairly large portion, with settlements as the main use in this category. The results of the identification of existing land use in 2023 can be seen in Table 2.

Table 2. Land Use Identification in 2023

No	Land Use in 2023	Built-up Area	Area (Ha)	%
1	Water Body	Non Awakened	55.40	1.93%
2	City Forest	Non Awakened	19.38	0.68%
3	Park	Non Awakened	74.06	2.58%
4	Burial	Non Awakened	18.93	0.66%
5	Shrubs	Non Awakened	733.40	25.56%
6	Plantation	Non Awakened	302.92	10.56%
7	Field	Non Awakened	521.98	18.19%
8	Ricefield	Non Awakened	36.09	1.26%
9	Fish pond	Non Awakened	8.76	0.31%
10	Road Body	Awake	52.99	1.85%
11	Settlement	Awake	850.69	29.65%
12	Public Service Facilities	Awake	71.17	2.48%
13	Office	Awake	5.47	0.19%
14	Defense and Security	Awake	0.32	0.01%
15	Trade and Services	Awake	108.73	3.79%
16	Warehousing	Awake	9.29	0.32%
Total (Ha)			2,869.58	100.00%

Source: Results of the Pleiades Satellite Interpretation Analysis in 2023

Settlement is the largest land use with an area of 850.69 hectares, spread across all sub-districts, especially in Simpang Selayang Sub-district (216.48 ha), Mangga Sub-district (191.94 ha), and Tanjung Selamat Sub-district (145.09 ha). Shrubs also cover a large area, namely 733.40 hectares, with the highest concentration in Mangga Sub-district (191.38 ha), Simpang Selayang Sub-district (110.83 ha), and Simalingkar B Sub-district (70.07 ha). Fields cover 521.98 hectares, most dominant in Simalingkar B Sub-district (201.58 ha), Simpang Selayang Sub-district (71.77 ha), and Mangga Sub-district (51.57 ha).

In terms of location, Mangga Village is the village with the largest land area (563.14 ha) dominated by settlements, bushes, and parks. Simpang Selayang Village (492.96 ha) and Simalingkar B Village (478.29 ha) also have large land coverage, dominated by settlements and fields. Tanjung Selamat Village (383.97 ha) is mostly used for settlements and bushes. Baru Ladang Bambu Village (244.18 ha) and Kemenangan Tani Village (199.51 ha) have a more balanced distribution between fields and bushes. Villages with smaller land coverage, such as Namo Gajah Village (140.31 ha) and Sidomulyo Village (185.05 ha), are mostly used for settlements, parks, and public service facilities. Overall, this area shows rapid development with a predominance of settlements and agricultural land, while several sub-districts still maintains the area for parks and bushes. The distribution of land use in 2023 per sub-district can be seen in Figure 5 and the visual map of land use can be seen in Figure 6.

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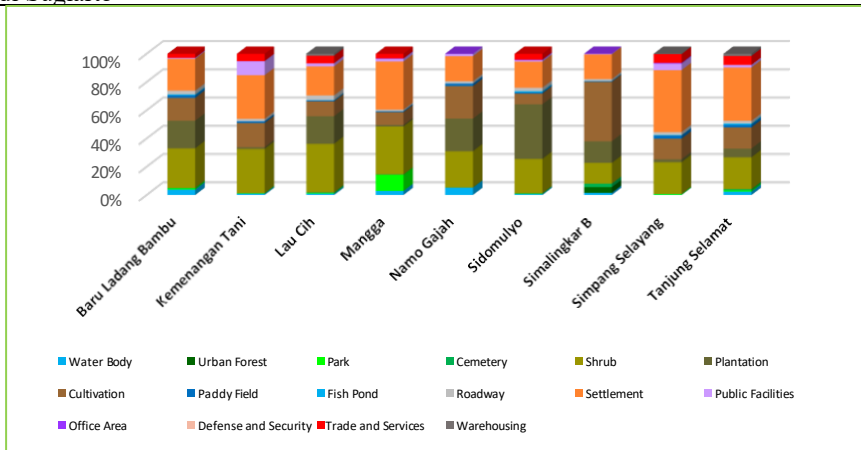


Figure 5. Distribution of UsageLand in 2023 Per Subdistrict

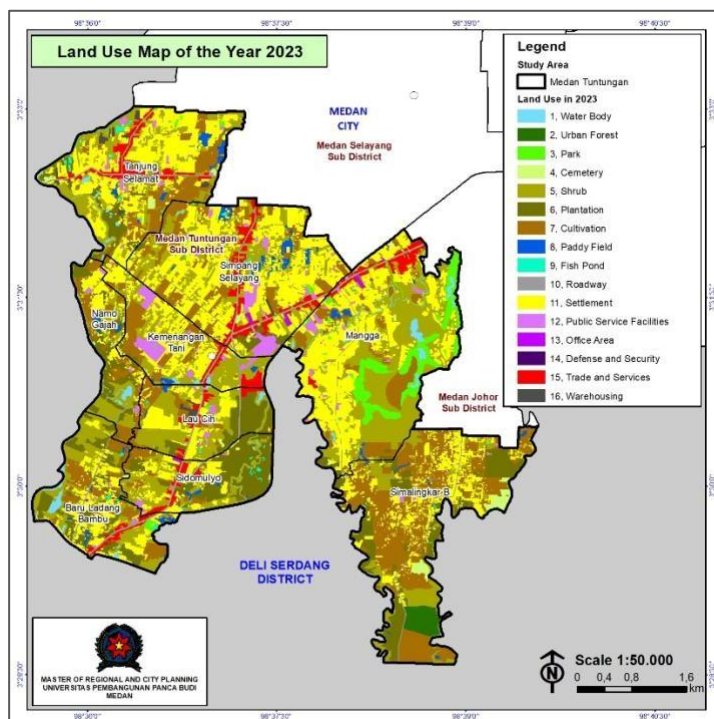


Figure 6. Existing Land Use Map 2023

Dynamics of Changes in Existing Land Use 2015-2023

In a period of eight years, from 2015 to 2023, there was a significant change in land use in Medan Tuntungan District covering an area of 695.23 hectares (23.23%), where there was a dynamic change in land use from non-built land (open land) to built land. The distribution of changes in land use in 2015-2023 can be seen in Table 3.

Table 3. Land Use Changes 2015-2023

No	Land Use	Year 2015		Year 2023		Land Use Change	
		Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
1	Water Body	66.51	2.32%	55.40	1.93%	-11.10	-0.39%
2	City Forest	19.38	0.68%	19.38	0.68%	-	0.00%
3	Park	73.60	2.56%	74.06	2.58%	0.46	0.02%
4	Burial	10.61	0.37%	18.93	0.66%	8.32	0.290%
5	Shrubs	713.10	24.85%	733.40	25.56%	20.30	0.71%
6	Plantation	380.70	13.27%	302.92	10.56%	-77.78	-2.71%
7	Field	656.66	22.88%	521.98	18.19%	-134.68	-4.69%
8	Ricefield	146.85	5.12%	36.09	1.26%	-110.75	-3.86%

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No	Land Use	Year 2015		Year 2023		Land Use Change	
		Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
9	Fish pond	9.66	0.34%	8.76	0.31%	-0.90	-0.03%
10	Road Body	52.99	1.85%	52.99	1.85%	-	0.00%
11	Settlement	616.31	21.48%	850.69	29.65%	234.38	8.17%
12	Public Service Facilities	54.12	1.89%	71.17	2.48%	17.05	0.59%
13	Office	4.76	0.17%	5.47	0.19%	0.71	0.02%
14	Defense and Security	0.32	0.01%	0.32	0.01%	-	0.00%
15	Trade and Services	55.83	1.95%	108.73	3.79%	52.90	1.84%
16	Warehousing	8.19	0.29%	9.29	0.32%	1.10	0.04%
Total (Ha)		2,869.58	100.00%	2,869.58	100.00%	-	0.00%

Source: Satellite Image Interpretation Analysis Results

Non-built-up land (open land) experienced an overall decline, especially in the agricultural land category. Paddy fields shrank drastically by 110.75 hectares (3.86%), followed by fields which decreased by 134.68 hectares (4.69%) and plantations which decreased by 77.78 hectares (2.71%). Meanwhile, shrubs increased by 20.30 hectares (0.71%). Water bodies also experienced a decline of 11.10 hectares (0.39%). Several categories of non-built-up land experienced a small increase, such as parks which increased by 0.46 hectares (0.02%) and cemeteries which increased by 8.32 hectares (0.29%).

On the other hand, built-up land experienced a significant expansion. Residential areas experienced a significant increase of 234.38 hectares (8.17%), making it the category with the highest growth. Land used for trade and services increased by 52.90 hectares (1.84%), while public service facilities increased by 17.05 hectares (0.59%). Office land, warehouses, and roads remained stable with minimal changes.

Overall, the land use change trend shows a significant increase in residential development and the economic sector, with the main degradation occurring in agricultural land, especially rice fields and fields. This reflects the direction of regional development that is increasingly oriented towards urbanization and infrastructure development in Medan Tuntungan District.

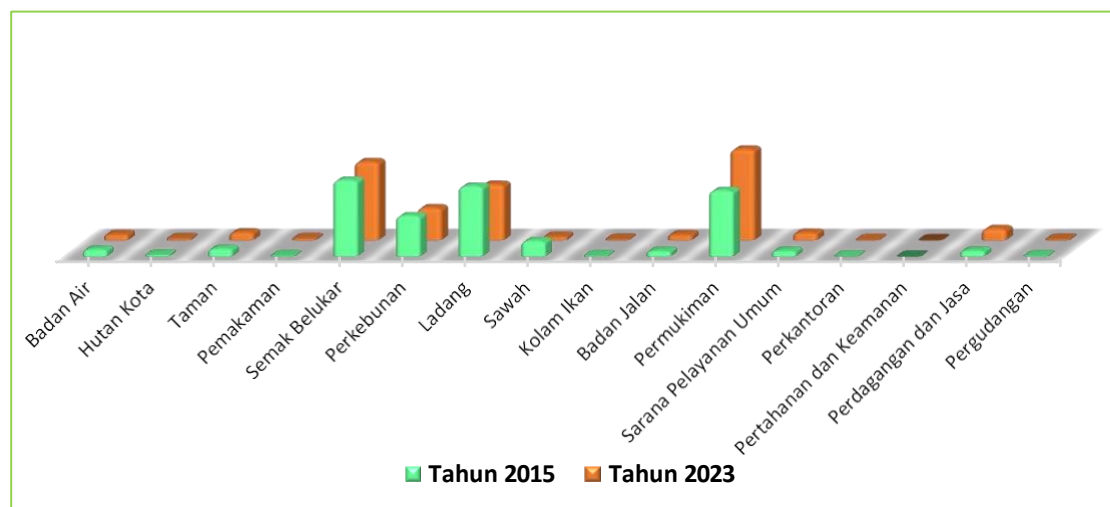


Figure 7. Graph of Changes in Existing Land Use 2015-2023

Based on the land use change transition matrix for 2015-2023 (eight-year period), it is known that the largest land use change is the reduction of fields, rice fields, plantations, and bushes, which are mostly converted into settlements, trade, and public service facilities. From Table 4, it can be seen that the largest conversion of field land is to built-up land in the category of settlements covering an area of 106.98 hectares, to trade and services covering an area of 11.40 hectares, and to public service facilities covering an area of 11.00 hectares. As well as conversion to non-built-up land in the category of bushes covering an area of 116.76 hectares, to plantations covering an area of 10.91 hectares, and to cemeteries covering an area of 3.99 hectares.

Rice fields experienced a dominant change in function on built-up land in the category of becoming settlements covering an area of 23.10 hectares and becoming fish ponds covering an area of 1.57 hectares. As well as a change in function to non-built-up land in the category of becoming bushes covering an area of 50.90 hectares and fields

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covering an area of 32.62 hectares. While plantation land experienced a dominant change in function on built-up land in the category of becoming settlements covering an area of 35.66 hectares and becoming public service facilities covering an area of 2.88 hectares. As well as a change in function to non-built-up land in the category of becoming bushes covering an area of 36.80 hectares and becoming fields covering an area of 16.96 hectares.

On the other hand, the residential category experienced rapid growth with an additional 234.38 hectares, which came from the conversion of fields (+106.98 ha), bushes (+93.69 ha), plantations (+35.66 ha), rice fields (+23.10 ha), and water bodies (+0.82 ha). Trade and services also experienced an increase in area of 52.90 hectares, which partly came from the conversion of residential land (+25.15 ha), bushes (+14.53 ha), and fields (+11.40 ha).

Land for public service facilities and offices also experienced growth, although on a smaller scale. Public facilities increased by 17.05 hectares, while office land experienced a slight expansion of 0.71 hectares.

Overall, this pattern of change shows a fairly strong urbanization trend, with many agricultural lands being converted into residential and commercial areas. This reflects the increasing need for residential space and supporting facilities along with population growth and regional development. However, this trend also indicates a reduction in green and agricultural land, which can have an impact on ecological balance and food security in the future. The complete land use change transition matrix for 2015-2023 can be seen in Table 4.

Table 4. Matrix Land Use Change Transition 2015-2023

Land Use	2015	2023										
		1	2	3	4	5	6	7	8	9	10	11
Water Body	1	55.40				8.77	1.40					0.82
City Forest	2		19.38									
Park	3			73.60								
Burial	4				10.61							
Shrubs	5			0.46	0.51	518.57	4.65	68.01	0.22			93.69
Plantation	6				3.82	36.80	283.15	16.69				35.66
Field	7				3.99	116.76	10.91	404.12	0.18			106.98
Ricefield	8					50.90	2.52	32.62	35.69	1.57		23.10
Fish pond	9					1.61	0.28	0.54		7.19		
Road Body	10										52.99	
Settlement	11											590.44
Public Service Facilities	12											
Office	13											
Defense and Security	14											
Trade and Services	15											
Warehousing	16											
Area (Ha)		55.40	19.38	74.06	18.93	733.40	302.92	521.98	36.09	8.76	52.99	850.69

Source: Satellite Image Interpretation Analysis Results

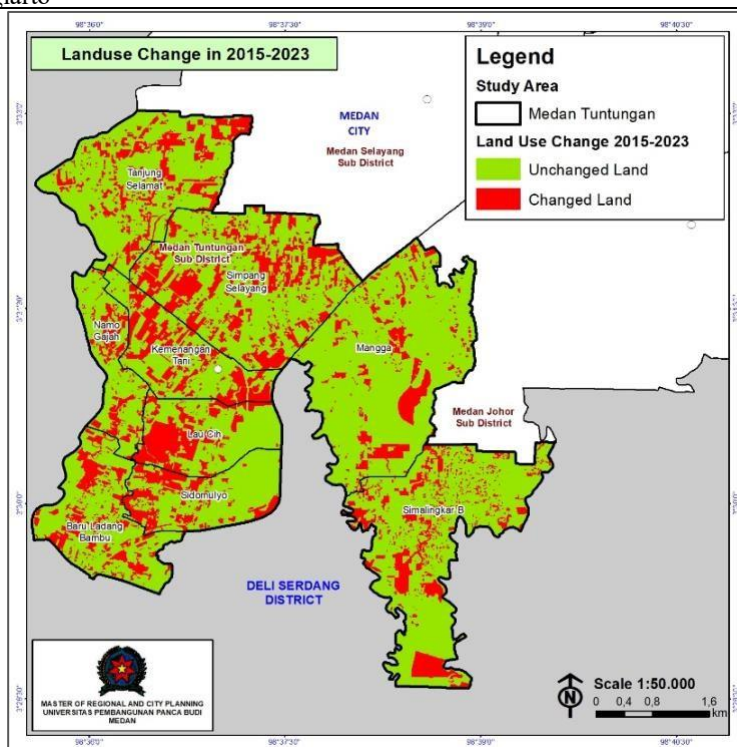


Figure 8. Map of Existing Land Use Changes 2015-2023

Medan City RDTR Spatial Plan 2015

The total area of Medan Tuntungan District planned in the 2015 Medan City Detailed Spatial Plan (RDTR) reaches 2,869.58 hectares, which is divided into two main area categories, namely protected areas and cultivation areas.

The protected area covers a total of 685.71 hectares (23.90%), this area consists of various sub-zones that function as green open spaces (RTH) and local border protection. The largest green open space is the city forest (RTH-5) which covers 126.09 hectares (4.39%), followed by the village park (RTH-1) covering 123.72 hectares (4.31%). In addition, there is a tourist area (RTH-4) of 90.13 hectares (3.14%) and a sports field (RTH-6) covering 81.19 hectares (2.83%). The public cemetery (RTH-3) is also part of the protected area with an area of 83.68 hectares (2.92%). In addition to green open space, protected areas also include various local protection zones, such as river borders (PS-2) covering 86.64 hectares (3.02%), polder borders (PS-6) covering 18.36 hectares (0.64%), canal borders (PS-7) covering 4.62 hectares (0.16%), and railway borders (PS-8) covering 17.55 hectares (0.61%). Meanwhile, blue open spaces (NH-2) covering water bodies such as lakes and reservoirs cover 53.74 hectares (1.87%).

Cultivation areas dominate land use with a total area of 2,183.87 hectares (76.10%), this area consists of various sub-zones, including residential areas, trade, commercial services, and public service facilities. The residential area is the largest spatial pattern plan, with the high-density housing category (R-1) covering 678.47 hectares (23.64%), followed by medium-density housing (R-2) covering 571.60 hectares (19.92%) and low-density housing (R-3) covering 344.26 hectares (12.00%). In addition to residential areas, trade and commercial service areas also play an important role in the city's spatial pattern. The trade area (K-1) covers 67.54 hectares (2.35%), while the commercial service area (K-2) covers 106.27 hectares (3.70%). The office area (KT) has a smaller coverage, only around 4.18 hectares (0.15%). Meanwhile, public infrastructure also received a fairly large allocation, with public service facilities (SPU) covering 67.48 hectares (2.35%) and roads (J) covering an area of 247.89 hectares (8.64%).

The 2015 Medan City RDTR spatial pattern plan in Medan Tuntungan District shows that cultivated areas dominate the planning zoning, especially for high and medium density housing. On the other hand, protected areas remain an important part of spatial planning, with designations as green open spaces, local protection, and water bodies. This planning reflects a balance between the need for urban development and efforts maintaining environmental sustainability through the provision of green spaces and ecosystem protection areas. The distribution of the Medan City RDTR spatial pattern plan in Medan Tuntungan District can be seen in Table 5 and Figure 9.

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Table 5. PlanSpatial Pattern of Medan City RDTR in Medan Tuntungan District

No	2015 RDTR Spatial Plan			Area (Ha)	%
	Type	Sub Zone	Code		
1	Protected Area	River Boundary	PS-2	86.64	3.02%
2		Polder Border	PS-6	18.36	0.64%
3		Ditch Boundary	PS-7	4.62	0.16%
4		Railway Border	PS-8	17.55	0.61%
5		Green Open Space in Village Park	RTH-1	123.72	4.31%
6		Green Open Space TPU	RTH-3	83.68	2.92%
7		Green Open Space Tourism Area	RTH-4	90.13	3.14%
8		Green Open Space City Forest	RTH-5	126.09	4.39%
9		Green Open Space Sports Field	RTH-6	81.19	2.83%
10		Blue Open Space	NH-2	53.74	1.87%
Protected Area Subtotal				685.71	23.90%
11	Cultivation Area	Agriculture	PL	96.18	3.35%
12		High Density Housing	R-1	678.47	23.64%
13		Medium Density Housing	R-2	571.60	19.92%
14		Low Density Housing	R-3	344.26	12.00%
15		Trading	K-1	67.54	2.35%
16		Commercial Services	K-2	106.27	3.70%
17		Office	KT	4.18	0.15%
18		Public Service Facilities	SPU	67.48	2.35%
19		Road	J	247.89	8.64%
Subtotal Cultivation Area				2,183.87	76.10%
Total (Ha)				2,869.58	100.00%

Source: Medan City RDTR Regional Regulation Number 2 of 2015

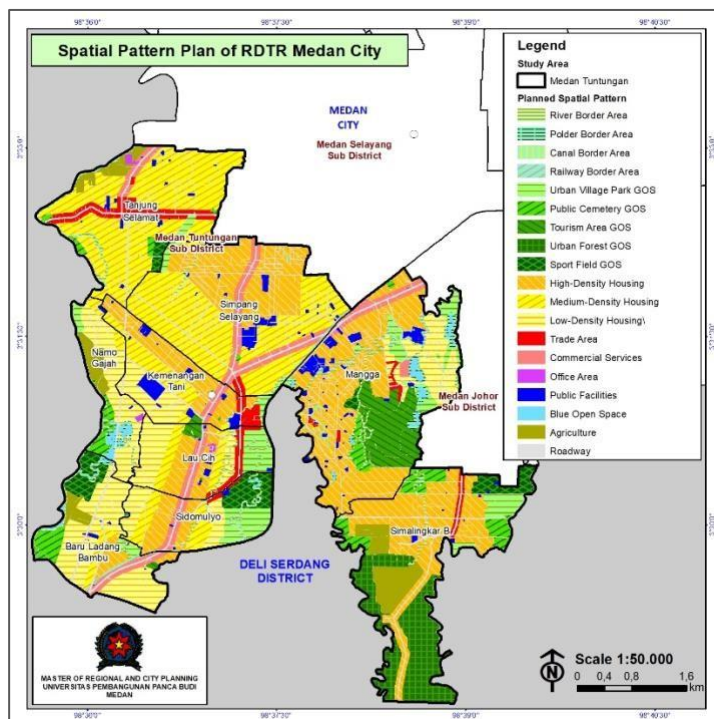


Figure 9. Medan City RDTR Spatial Plan Map 2015

LAND USE CHANGE REGARDING SPATIAL PLANNING IN MEDAN TUNGGAN DISTRICT

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Suitability of Land Use in 2015 to the Medan City RDTR Spatial Plan in 2015

The protected area has an area of 685.71 hectares, of which 129.54 hectares (18.89%) are in accordance with the plan and have been realized. However, there are still 480.81 hectares (70.10%) that are appropriate but have not been realized, and 75.04 hectares (10.94%) whose utilization is not in accordance.

Among the protected area zoning, urban forests (RTH-5) have a fairly good level of suitability with 17.57 hectares having been realized and 103.55 hectares not yet realized. Likewise, the urban park (RTH-1) which has been realized by 13.63 hectares, while 102.35 hectares have not yet been realized. Meanwhile, the river boundary zone (PS-2) has a total area of 86.64 hectares, of which 52.41 hectares have been realized, while 14.23 hectares have not yet been realized, and 19.96 hectares are not suitable for its purpose.

The cultivation area covers an area of 2,183.87 hectares, with 641.25 hectares (29.36%) having been compliant and realized, while 1,077.07 hectares (49.34%) are still compliant but have not been realized. However, there are 258.72 hectares (11.85%) that do not comply with their designation, and 206.83 hectares (9.47%) are at a technical mapping difference. The residential area is the largest part of the cultivation area, where high-density housing (R-1) has an area of 678.47 hectares, with 222.46 hectares already compliant and realized, while 391.59 hectares have not been realized. On the other hand, 63.45 hectares do not comply with their designation.

The trading area (K-1) has an area of 67.54 hectares, with only 9.05 hectares being appropriate and already realized, while 23.77 hectares have not yet been realized, and 33.35 hectares are not in accordance with their designation. Meanwhile, the road body zoning (J) has an area of 247.89 hectares, with 46.87 hectares being appropriate and already realized. However, there are 201.02 hectares that are in the technical mapping difference.

Overall, the suitability of existing land use in 2015 with the 2015 RDTR plan in Medan Tuntungan District still has appropriate land use and has been realized covering an area of 770.79 hectares (28.86%), appropriate land use and has not been realized covering an area of 1,557.89 hectares (54.29%), land use that is not in accordance with its designation covering an area of 333.77 hectares (11.63%), and the rest there are differences in map accuracy. So it is concluded that there is a land area of 1,891.65 hectares (65.92%) that needs to be realized until the end of the planning year and the Medan City RDTR in Medan Tuntungan District at the beginning of the planning year still has an implementation performance of 26.86%. As well as the inconsistency of designation, especially in the zoning of residential areas, trade, and green open spaces. This shows the need for great efforts to ensure that land use remains in line with the established spatial planning, especially in Medan Tuntungan District. The suitability of land use in 2015 to the 2015 Medan City RDTR spatial pattern plan can be seen in Table 6 and Figure 10.

Table 6. Suitability of UseLand in 2015 Against the Medan City RDTR Spatial Plan 2015

No	2015 RDTR Spatial Plan			Suitability of Existing Land Use 2015				Area (Ha)
	Type	Sub Zone	Code	Appropriate (Already Realized)	As per (Not Yet Realized)	Not Suitable (Utilization)	Not Suitable (Map Technical)	
1	Protected Area	River Boundary	PS-2	52.41	14.23	19.96	0.04	86.64
2		Polder Border	PS-6	6.49	0.98	10.88	-	18.36
3		Ditch Boundary	PS-7	1.88	0.33	2.41	-	4.62
4		Railway Border	PS-8	4.30	6.09	7.03	0.12	17.55
5		Green Open Space in Village Park	RTH-1	13.63	102.35	7.71	0.02	123.72
6		Green Open Space TPU	RTH-3	10.81	61.63	11.19	0.05	83.68
7		Green Open Space Tourism Area	RTH-4	22.42	63.79	3.87	0.05	90.13
8		Green Open Space City Forest	RTH-5	17.57	103.55	4.96	-	126.09
9		Green Open Space Sports Field	RTH-6	0.03	75.73	5.42	0.00	81.19
10		Blue Open Space	NH-2	-	52.11	1.60	0.02	53.74
Protected Area Subtotal				129.54	480.81	75.04	0.31	685.71
11	Cultivation Area	Agriculture	PL	74.11	15.66	6.40	-	96.18
12		High Density Housing	R-1	222.46	391.59	63.45	0.96	678.47

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No	2015 RDTR Spatial Plan			Suitability of Existing Land Use 2015				Area (Ha)
	Type	Sub Zone	Code	Appropriate (Already Realized)	As per (Not Yet Realized)	Not Suitable (Utilization)	Not Suitable (Map Technical)	
13		Medium Density Housing	R-2	166.59	340.87	63.96	0.17	571.60
14		Low Density Housing	R-3	54.89	253.36	34.96	1.05	344.26
15		Trading	K-1	9.05	23.77	33.35	1.37	67.54
16		Commercial Services	K-2	31.96	32.51	39.64	2.15	106.27
17		Office	KT		1.30	2.87	0.00	4.18
18		Public Service Facilities	SPU	35.30	18.01	14.07	0.10	67.48
19		Road	J	46.87	-	-	201.02	247.89
Subtotal Cultivation Area				641.25	1,077.07	258.72	206.83	2,183.87
Total (Ha)				770.79	1,557.89	333.77	207.14	2,869.58

Source: Author's Analysis

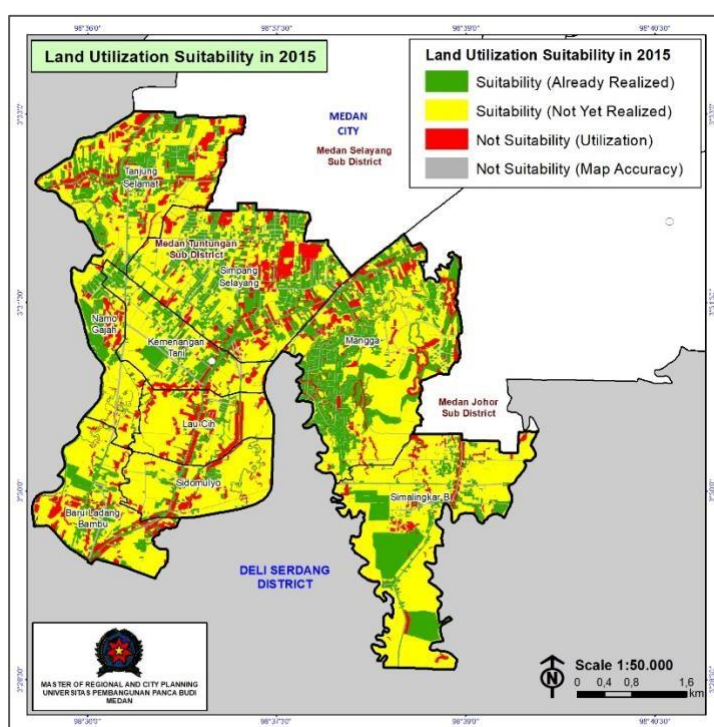


Figure 10. 2015 Land Use Suitability Map

Suitability of Land Use in 2023 to the 2015 Medan City RDTR Spatial Plan

In 2023, the suitability of the spatial pattern plan in the Medan City RDTR with existing land use showed significant development compared to 2015. Most of the land use has been used in accordance with the spatial plan, although there are still several areas whose use is not in accordance with the designation.

Protected areas have seen an increase in land use realization, especially in green open spaces such as urban forests and parks. Of the total protected areas, around 160.69 hectares (5.60%) have been in accordance with their designation, while 432.16 hectares (15.06%) are still in the unrealized category. However, there are 92.54 hectares (3.23%) of protected area land used for other purposes that are not in accordance with the spatial plan, such as settlements and economic activities.

On the other hand, the cultivation area shows a positive trend with an increase in realization in high, medium, and low density housing zones. Of the total cultivation area of 2,183.87 hectares, 861.25 hectares (30.02%) are in accordance with the spatial plan, while 921.62 hectares (32.12%) have not been realized. The residential sector has experienced an increase in the area of appropriate land use, with high-density housing areas reaching 287.22 hectares

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(10.01%), medium-density housing 253.42 hectares (8.83%), and low-density housing 98.79 hectares (3.44%). Trade and service zoning is also growing, with a realization of 74.59 hectares (2.60%) of the total planned 173.81 hectares.

Overall, the suitability of existing land use in 2023 with the 2015 RDTR plan in Medan Tuntungan District still has appropriate land use and has been realized covering an area of 1,021.94 hectares (35.61%), appropriate land use that has not been realized covering an area of 1,353.79 hectares (47.18%), land use that is not in accordance with its designation covering an area of 286.71 hectares (9.99%), and the rest there are differences in map accuracy. So it is concluded that the Medan City RDTR in Medan Tuntungan District in 2023 experienced an increase in implementation performance of 35.61% or an increase of 8.75% from 2015. However, there are still challenges that must be faced, such as supervision of land conversion in protected areas, acceleration of the development of planned public service facilities, and re-evaluation of several zones that have not developed as expected. With tighter planning and better supervision, it is hoped that land use can be more optimal and support sustainable development in the future.

The suitability of land use in 2023 to the 2015 Medan City RDTR spatial pattern plan can be seen in Table 7 and Figure 11.

Table 7. Compliance Land Use in 2023 Against the Medan City RDTR Spatial Plan 2015

No	2015 RDTR Spatial Plan			Suitability of Existing Land Use 2023				Area (Ha)
	Type	Sub Zone	Code	Appropriate (Already Realized)	As per (Not Yet Realized)	Not Suitable (Utilization)	Not Suitable (Map Technical)	
1	Protected Area	River Boundary	PS-2	51.84	14.60	20.16	0.04	86.64
2		Polder Border	PS-6	6.91	1.27	10.18		18.36
3		Ditch Boundary	PS-7	2.06	0.28	2.28		4.62
4		Railway Border	PS-8	4.05	4.65	8.72	0.12	17.55
5		Green Open Space in Village Park	RTH-1	13.99	99.53	10.18	0.02	123.72
6		Green Open Space TPU	RTH-3	9.85	59.72	14.07	0.05	83.68
7		Green Open Space Tourism Area	RTH-4	22.43	62.81	4.84	0.05	90.13
8		Green Open Space City Forest	RTH-5	17.57	96.62	11.89		126.09
9		Green Open Space Sports Field	RTH-6	0.03	73.09	8.07	0.00	81.19
10		Blue Open Space	NH-2	31.97	19.60	2.15	0.02	53.74
Protected Area Subtotal				160.69	432.16	92.54	0.31	685.71
11	Cultivation Area	Agriculture	PL	65.80	15.36	15.02		96.18
12		High Density Housing	R-1	287.22	340.54	49.75	0.96	678.47
13		Medium Density Housing	R-2	253.42	275.67	42.34	0.17	571.60
14		Low Density Housing	R-3	98.79	227.12	17.29	1.05	344.26
15		Trading	K-1	21.40	22.77	22.00	1.37	67.54
16		Commercial Services	K-2	53.19	24.68	26.24	2.15	106.27
17		Office	KT	0.30	1.29	2.58	0.00	4.18
18		Public Service Facilities	SPU	34.26	14.19	18.94	0.10	67.48
19		Road	J	46.87				201.02
Subtotal Cultivation Area				861.25	921.62	194.16	206.83	2,183.87

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No	2015 RDTR Spatial Plan			Suitability of Existing Land Use 2023				Area (Ha)
	Type	Sub Zone	Code	Appropriate (Already Realized)	As per (Not Yet Realized)	Not Suitable (Utilization)	Not Suitable (Map Technical)	
Total (Ha)				1,021.94	1,353.79	286.71	207.14	2,869.58

Source: Author's Analysis

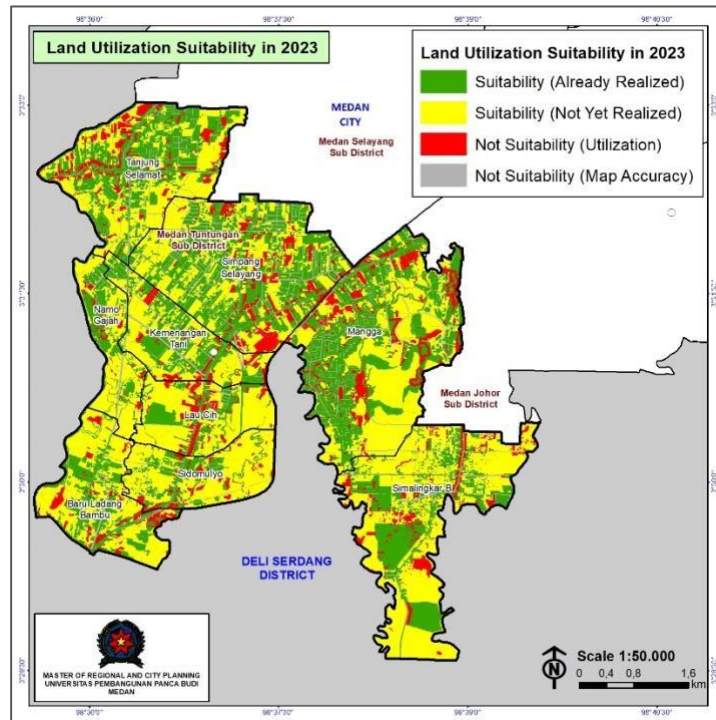


Figure 11. Map of Land Use Suitability in 2023

Suitability of Land Use Changes (2015-2023) to the Medan City RDTR Spatial Plan 2015

Land use changes over an eight-year period from 2015 to 2023 in Medan Tuntungan District covering an area of 695.23 hectares (23.23%). Of which 612.62 hectares (88.12%) were in accordance with RDTR directives and 82.60 hectares (11.88%) were not in accordance with RDTR directives.

In the protected area plan, there was a change in land use of 112.24 hectares, with 79.57 hectares (70.92%) in accordance with the RDTR directives and 32.67 hectares (29.08%) not in accordance. The largest change occurred in the city forest area with implementation in accordance with the RDTR directives reaching 16.06 hectares, but there were 8.10 hectares that were used inappropriately. In addition, the cemetery and city park areas also experienced significant changes in land use, with some of the land still not in accordance with the RDTR directives.

On the other hand, in the cultivation area plan, there was a change in land use of 582.98 hectares, with 533.05 hectares (91.43%) in accordance with the RDTR directive and 49.93 hectares (8.57%) not in accordance. The biggest changes occurred in residential areas with high-density housing zoning (156.37 hectares), medium-density housing (175.04 hectares), and low-density housing (98.43 hectares), the majority of which were in accordance with the RDTR directive. In addition, trade and service zoning also experienced development with an additional 42.86 hectares, although there were around 8.51 hectares that were not in accordance with the RDTR directive.

Overall, the level of conformity of land use changes to the RDTR is quite high, with most changes occurring in residential areas and green open spaces. However, there are still challenges in managing land changes that are not in accordance with planning, especially in protected areas that are experiencing land conversion pressure. Tighter supervision and adaptive policies are needed to ensure that land changes can continue to support sustainable development in accordance with the established RDTR.

The suitability of land use changes (2015-2023) to the 2015 Medan City RDTR plan can be seen in Table 8 and Figure 12.

Table 8. Compliance Land Use Changes (2015-2023) Against the 2015 Medan City RDTR Plan

No	2015 RDTR Spatial Plan			Land Use Change Suitability 2015-2023		Area (Ha)
	Type	Sub Zone	Code	According to RDTR Directions	Not in accordance with RDTR directives	
1	Protected Area	River Boundary	PS-2	6.21	3.91	10.13
2		Polder Border	PS-6	1.53	0.14	1.67
3		Ditch Boundary	PS-7	0.48	0.33	0.81
4		Railway Border	PS-8	1.53	2.95	4.48
5		Green Open Space in Village Park	RTH-1	10.49	4.62	15.11
6		Green Open Space TPU	RTH-3	13.59	5.21	18.79
7		Green Open Space Tourism Area	RTH-4	14.98	1.09	16.08
8		Green Open Space City Forest	RTH-5	16.06	8.10	24.16
9		Green Open Space Sports Field	RTH-6	8.44	5.46	13.91
10		Blue Open Space	NH-2	6.27	0.85	7.11
Protected Area Subtotal				79.57	32.67	112.24
11	Cultivation Area	Agriculture	PL	15.17	8.65	23.82
12		High Density Housing	R-1	156.37	14.60	170.97
13		Medium Density Housing	R-2	175.04	12.67	187.71
14		Low Density Housing	R-3	98.43	1.67	100.10
15		Trading	K-1	16.38	4.94	21.32
16		Commercial Services	K-2	26.48	3.57	30.05
17		Office	KT	0.01	0.22	0.23
18		Public Service Facilities	SPU	4.87	3.62	8.49
19		Road	J	40.30		40.30
Subtotal Cultivation Area				533.05	49.93	582.98
Total (Ha)				612.62	82.60	695.23

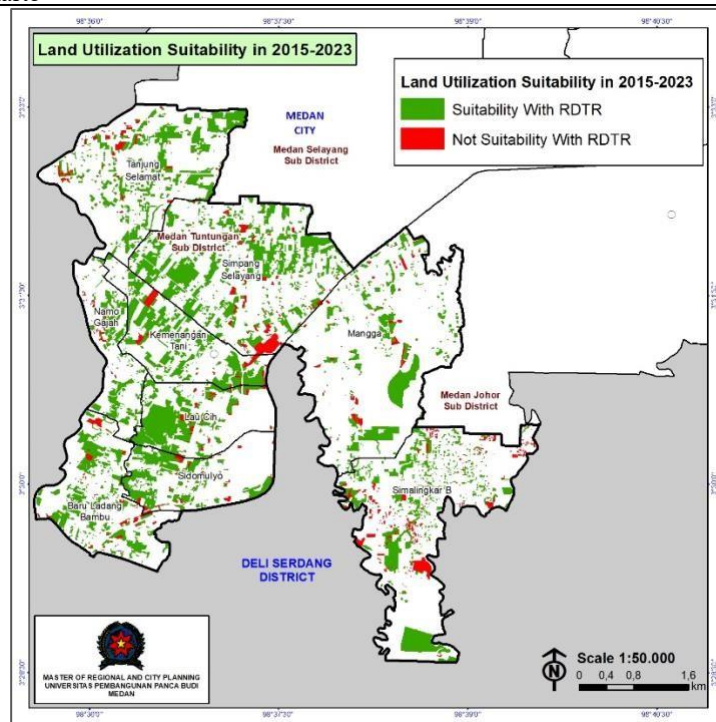


Figure 12. Land Use Change Suitability Map 2015-2023

5. Conclusion

1. Existing land use in 2015 in Medan Tuntungan District was dominated by non-built land covering an area of 2,077.07 hectares or 72.38% with most of the land use being shrubs (24.85%), fields (22.88%), and plantations (13.27%). While built-up land was only 792.52 hectares or 27.62% dominated by residential land use of 21.48% and trade services of 1.95%.
2. Existing land use in 2023 in Medan Tuntungan District is still dominated by non-built land covering an area of 1,770.93 hectares or 61.71% with the majority of land use being shrubs (25.56%), fields (18.18%), and plantations (10.56%). Meanwhile, built-up land covering an area of 1,098.66 hectares or 38.29% is dominated by residential land use of 29.65% and trade services of 3.79%.
3. Land use in Medan Tuntungan District over a period of eight years, from 2015 to 2023, has changed significantly by 695.23 hectares (23.23%). Where there are dynamics of changes in land use from non-built land to built land which has decreased by -306.14 hectares (-10.67%), especially in rice fields which have drastically decreased by 110.75 hectares (3.86%), followed by fields which have decreased by -134.68 hectares (-4.69%) and plantations which have decreased by -77.78 hectares (-2.71%). The changes in land have been largely converted into settlements, trade, and public service facilities, so it can be stated that there has been a decrease in the function of productive agricultural land to built land in Medan Tuntungan District.
4. The suitability of land use in 2015 with the RDTR plan in Medan Tuntungan District at the beginning of the RDTR planning year still had an implementation performance of 770.79 hectares or 26.86% as land use that was in accordance with the RDTR and had been realized.
5. The suitability of land use in 2023 with the RDTR plan in Medan Tuntungan District has increased the implementation performance of 1,021.94 hectares or 35.61% as land use in accordance with the RDTR and has been realized. This shows that supervision of land conversion in protected areas, acceleration of the development of planned public service facilities, and re-evaluation of several zones that have not developed as expected are still needed.
6. The suitability of land use with the RDTR plan from changes in land use that occurred within a period of eight years (2015-2023) in Medan Tuntungan District covers 612.62 hectares (88.12%) which are in accordance with the RDTR directives and 82.60 hectares (11.88%) which are not in accordance with the RDTR directives.

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Indri Meiyanti and Abdi Sugiarto

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