Green open space analysis in West Binjai, North Sumatra

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Abstract. West Binjai is a sub-district located in Binjai City, North Sumatra. Green Open Space is also part of the Binjai city’s planning scheme which has many benefits for the community and the environment. This research used Normalized Difference Vegetation Index (NDVI) analysis and NDVI value classification results in the distribution of vegetation density. Analysis of changes in vegetation density was carried out between 2015 and 2020 in West Binjai. The largest change in the area of vegetation density classes in the West Binjai between 2015 and 2020 was the increase in the area of the high dense class to 19.13%. The sub-district has green open spaces in the form of sub-district parks, public cemeteries, road green lane, river bank and private green open spaces. These green open spaces were in the low dense, medium, dense and high dense classes. There is a need for rearrangement of green open spaces, especially those within low dense class. Replanting trees are also essential to increase the quality of the green area. Improving the quality of green space will lead to the enhancement of quality of environment.

1. Introduction
Regional development and growth has an impact on development and population density. The development of urban areas requires the availability of facilities with limited land, as well as an increase in the industrial and development sectors [1]. Urban areas are areas for government services, social services, industry, trade, transportation, learning and other economic activities. The concentration of activity in the city resulted in population density continuing to increase, in line with the increasing speed of development [2].

High population growth results in a limited area which is the basis for changes in land use. Changes in land use are limited, while the population continues to increase every year. The limited residential land urges the formation of new land uses [3].
Global warming is the continuity of ecosystem life on earth. Global warming is commonly known as the impact of the greenhouse effect due to the increasing concentration of greenhouse gases in the atmosphere. In this problem, CO2 contributes greenhouse gases to the formation of global warming. The provision of green open space (RTH) can minimize global warming [4].

Currently, Green Open Space in the global development environment is urgently needed to maintain a balance of environmental quality. RTH in urban areas has important ecological, socio-cultural, and aesthetic functions. Green space is used as a climate regulator, namely as a producer of oxygen, suppressor of noise and as a barrier to the reflection of sunlight. RTH can be used as a place for recreation, sports, educational facilities [5].

Binjai City is a lowland with an average height of ± 30 meters located at 3°31' 40" – 3° 40' 2" North Latitude and 98° 27' 3" – 98° 32' 32" East Longitude. The total area of Binjai City is 90,23 km2. Binjai City consists of 5 sub-districts, namely Binjai Kota District, North Binjai, South Binjai, West Binjai and East Binjai. In this study, the Normalized Difference Vegetation Index (NDVI) analysis was used to obtain the distribution of NDVI values and vegetation density levels in West Binjai District and Binjai Kota District from 2015 to 2020. The aim of the study was to find out the vegetation density Analyzing the distribution and dynamics of vegetation density in West Binjai District and Binjai City District.

1. Analyzing Green Open Space in East Binjai, West Binjai and Binjai Kota District. This research is expected to provide information about the spatial-based Green Open Space conditions in the Districts of West Binjai and Districts of Binjai Kota, which are beneficial for spatial planning and improving the quality of the environment for related parties. The provision of green open space is part of global warming, one of which is an effort to take action against increasing greenhouse gas emissions. With such considerations, green open space seeks to reduce CO2 emissions [6]. Green open space has something to do with ecology, such as green open space in climate control as an oxygen provider. According to Edyanto (2013), Emission is one of several dangerous environmental aspects that can have an impact on global changes in the world [7]. Certain fuels, such as hydrocarbons and organic lead, are released into the air due to evaporation from the fuel system.

According to Law number 26 of 2007 of the Republic of Indonesia, green open space is defined as a pathway area with a more open use, where plants grow, including plants that grow naturally and grow that are intentionally planted. Urban areas have also determined the proportion of green open space at least 30% of the total area. Green Open Space (RTH) is an undeveloped space in an area. An area such as a village, road or village, road, district, province and others. Green open space can increase not only social interaction in the area but also support environmental aesthetics such as increasing temperature, water absorption, decreasing air humidity and pollution [8]. Green open space acts as an absorber of vehicle CO2 emissions [9].

Vegetation is one of the constituent elements of urban areas and has many benefits. The benefits of vegetation in urban areas can directly or indirectly affect the surrounding air by changing the atmospheric conditions of the air environment. This diverse collection of vegetation will produce different vegetation densities for each land use in an area [10].

Remote sensing and Geographic Information Systems (GIS) are important technologies for obtaining and gathering information about objects. This technology can realize the change rate in less time with lower cost and higher accuracy. Information obtained from satellite imagery can be combined with other supporting data into a geographic information system [11].

Remote sensing application is an application that can be used to analyze the comfort of residential areas in urban areas. The information can be in the form of vegetation coverage, building density, the distance of settlements to main roads and industries as parameters that determine the comfort of the area [12].

The development of remote sensing technology and GIS, it provides inspiration for ease of planning and regional development. Information about objects somewhere on the earth’s surface is taken using satellite sensors and then according to the purpose of the activities to be carried out. The object information is processed, analyzed, interpreted and presented in the form of spatial information and thematic maps [13].
Data on vegetation density, land area, and conditions in the field can be detected from remote sensing techniques. In monitoring vegetation changes, satellite images are used for each development [14].

Vegetation as a component of land has very diverse types. Different collections of vegetation will produce different levels of vegetation density for each land use in an area. Vegetation has characteristics, so it can be analyzed in various ways to get a representative index of vegetation [15].

This vegetation density will create comfort and coolness in land use. The high and low vegetation density can be known by using the NDVI technique, which is a spectral sharpening image transformation to analyze matters related to vegetation [16].

NDVI is a standard method for comparing the greenness of vegetation in satellite imagery, which is a combination of alternative technology and image technology. NDVI can be used to calculate the greenery level [10]. NDVI is the most common formula for calculating the vegetation index value, which can provide information related to the primary production of vegetation. Identifying vegetated areas quickly using multispectral remote sensing data so that NDVI is able to manipulate errors due to topography [17].

Vegetation protects the hydrological environment from the impact of rain kinetic energy through three levels of the tree canopy, namely the canopy, trunk and forest litter. Dense canopy vegetation will increase the change in leaf area index value so that changes in the spectral reflectance value at the same canopy density are caused by differences in leaf area index, which will lead to density errors in the estimation of canopy area. So it is clear that by performing NDVI conversion, the density aspect can be highlighted [18].

2. Materials and methods
This research was conducted from November 2020 to March 2021, in West Binjai District and Binjai Kota District, North Sumatra. Data processing was carried out at the Forest Management Laboratory, Forestry Study Program, Faculty of Forestry, University of North Sumatra. The research location can be seen in Figure 1.

West Binjai District consists of 43 neighbourhoods from 6 villages, namely Bandar Snembah, Payaroba and Sukaramai, Suka Maju, Limau Mungkur and Limau Sundai. In 2019, the population of West Binjai District was 50,638 people. Payaroba Village has the highest population of 12,242 people,
while Bandar Senembah Village has the least population of 5,514 people. When viewed from the area of the village, the Payaroba Village has the largest area of 4.00 Km2 while the Sukaramai Village has the smallest area of 0.94 Km².

West Binjai sub-district is a sub-district in Binjai City with an average height of + 30 meters located at 3° 31' 40" – 3° 40' 2" North Latitude and 98° 27' 3" - 98° 32' 32" East Longitude. The area of West Binjai District is in the form of a land area of 10.86 km². West Binjai District is directly adjacent to Langkat Regency in the south, Langkat Regency in the west, North Binjai District in the north and Binjai Kota District in the east. The tools used in this study consisted of data collection tools and data analysis tools. Field data collection tools are GPS (Global Positioning System), stationery, camera. The data analysis tools used are ArcGis (ArcMap) 10.3, ERDAS Imagine 9.2, Google Earth, Microsoft Excel, Microsoft Word and computers. The materials used in this study are data taken from other sources and ground check data listed in Table 1.

| Data Name                          | Data Types   | Sources                      | Year |
|-----------------------------------|--------------|------------------------------|------|
| Field data (ground check)         | Primary      | GPS dan kamera digital       | 2020 |
| Citra Landsat 8 path/row 129/57   | Secondary    | www.glovis.usgs.gov          | 2015 |
| Citra Landsat 8 OLI path/row 129/57 | Secondary | www.earthexplorer.usgs.gov  | 2020 |
| Citra Google Earth                | Secondary    | Google earth                 | 2020 |
| Administrative Map of West Binjai | Secondary    | Geospatial Information Agency | |
| District and City Binjai District  | Secondary    | (BIG)                        | 2020 |
| Binjai City statistical data      | Secondary    | https://binjai Kota.bps.go.id | 2020 |

2.1. Data preparation and compilation
The data collection method in this study was carried out by identifying primary data and secondary data. Primary data is direct observation to the research location (ground check) using the purposive sampling method, while secondary data is data from government agencies related to this research. The image obtained through the website www.earthexplorer.usgs.gov consists of several separate bands. Therefore, it is necessary to combine the image bands for radiometric correction. Image band merging is done using ERDAS Imagine 9.2. After that, downloading the image through www.earthexplorer.usgs.gov, correction of the image is carried out by choosing the best image, so that a better quality image is obtained. Image cropping is done using ArcGIS 10.3 to crop the image with the administrative boundaries of the subdistrict to get the desired image. Field surveys were conducted to determine the field conditions directly. The results of the field survey are used to support the correctness of the data generated by image processing.

2.2. Vegetation density analysis
NDVI analysis was performed using the red and infrared bands. The resulting NDVI value ranges between -1 and +1 [19]. The range of values between -1 to +1 resulting from the NDVI transformation has different percentages of land use. The greater the NDVI value, the higher the density, and conversely, the lower the value, it is assumed that the area is a body of water.

The formula for calculating the NDVI value for Landsat 8 images is:

\[
NDVI = \frac{IR - R}{IR + R}
\]

NDVI has a value range from -0.1 to 1.0. Clouds, water, and non-vegetated objects have an NDVI of less than zero. Values that represent vegetation are in the range of 0.1 to 0.7 (Lufilah et al, 2017). In the NDVI value obtained from image processing, the density class is divided into non-vegetation, rare, medium, dense, very dense classes [17]. Classification of NDVI values is done by dividing 5 classes, namely non-vegetation density class, sparse density class, medium-density class, dense density class
and very dense density class. Analysis of changes was carried out on the 2015 and 2020 vegetation density maps. The stages of the analysis of vegetation density and their changes can be seen in Figure 2.

2.3. Green open space analysis
In this study, points were taken in the field to determine the distribution of green open space in West Binjai District and Binjai City District. The green open space analysis was carried out using a vegetation density class map and field checking data.

3. Results and discussion
3.1. Distribution of normalized difference vegetation index values in West Binjai District and Binjai City District
Normalized Difference Vegetation Index (NDVI) can be used to determine the density level of a vegetation. The NDVI value is closely related to the level of vegetation density so that it can be used to classify vegetation based on density. According to Sampurno and Thoriq (2016) the Normalized Difference Vegetation Index was obtained from processing Landsat images using the NDVI method [20]. Visual interpretation of the image is based on the introduction of the object's spatial characteristics. The characteristics of objects can be recognized by interpreting elements such as color, shape, dimension, pattern, texture, shadow, location and association of object appearance.

NDVI is closely related to vegetation density and can be used to classify vegetation based on its density. NDVI is used to determine the level of the greenness of very good vegetation Zaitunah et al. (2018) The maximum and minimum NDVI values obtained in image processing divide the density level into five classes, namely non-vegetation, rare, medium, dense and very dense classes [17].

West Binjai Subdistrict and Kota Binjai Subdistrict are one of the sub-districts that have experienced many land changes due to the increasing number of residents associated with the increasing human need for land use. Land use is used for residential, socio-economic and services. By doing NDVI analysis, the results of image processing in 2015 and 2020 in West Binjai District and Binjai City District are in the form of a map of the distribution of NDVI values. Vegetation as a constituent of land has very diverse types. A collection of vegetation produces a different vegetation density for each land use in an area. The map of the distribution of NDVI values in West Binjai District in 2015 can be seen in Figure 3.
Tab 6

Table 2. NDVI distribution of West Binjai year 2015.

| NDVI   | Area (Ha) | % Area |
|--------|-----------|--------|
| < 0    | 0.06      | 0.00   |
| 0 - 0.1| 0.84      | 0.06   |
| 0.1 - 0.2| 189.71  | 13.41  |
| 0.2 - 0.3| 443.56  | 31.35  |
| 0.3 - 0.4| 580.70  | 41.05  |
| >0.4   | 199.76    | 14.12  |
| Total  | 1,414.63  | 100    |

From Table 2 it can be seen that in 2015 in West Binjai District, the largest NDVI value was in the range of 0.3 - 0.4, which was 580.70 ha (41.05%), while the smallest was in the range < 0, which was 0.06 ha (0.00%) of the total area of West Binjai District in 2015 amounted to 1,414.63 ha. The distribution of NDVI values in West Binjai District in 2015 can be seen from Figure 4.

Figure 3. Distribution of NDVI values in West Binjai District 2015.

The map of the distribution of NDVI values in West Binjai District in 2020 can be seen in Figure 4.

Figure 4. NDVI distribution map of West Binjai year 2020.
Table 3. NDVI distribution of West Binjai year 2020.

| NDVI value | Area  | % Area |
|------------|-------|--------|
| < 0        | 0.05  | 0.00   |
| 0.0 - 0.1  | 10.53 | 0.74   |
| 0.1 - 0.2  | 208.49| 14.74  |
| 0.2 - 0.3  | 346.50| 24.49  |
| 0.3 - 0.4  | 378.74| 26.77  |
| 0.4 - 0.5  | 465.02| 32.87  |
| > 0.5      | 5.43  | 0.38   |
| Total      | 1,414.75| 100 |

From Table 3, it can be seen that in 2020 in West Binjai District, the largest NDVI value was in the range of 0.4 – 0.5, which was 465.02 ha (32.87%), while the smallest was in the range < 0 which was 0.05 ha. The distribution of NDVI values in West Binjai District in 2020 can be seen from Figure 5.

The distribution map of NDVI values in Binjai Kota District in 2015 can be seen in Figure 5. From Table 5, it can be seen that in 2020 in Binjai Kota District, the largest NDVI value was in the range 0.1 – 0.2, which was 122.15 ha (26.69%), while the smallest was in the range < 0 which was 0.11 ha (0.02%) of the total area of Binjai Kota District in 2020 of 457.67 ha.

3.2. Vegetation density class in West Binjai District and Binjai City District

Based on the results of data in the field, non-vegetation density classes with NDVI values <0.1 are buildings and settlements. In the rare density class with NDVI values of 0.1 - 0.2 there are settlements and some of the various vegetation such as dryland agriculture. In the medium density class with an NDVI value of 0.2 – 0.3, there are settlements, cemeteries, and vegetation such as those in oil palm plantations and agricultural land. There are several settlements that are included in the dense class where many settlements are surrounded by vegetation because many settlements have fairly large yards and are planted with vegetation. In the dense density class with an NDVI value of 0.3 – 0.4, there are grasslands, shrubs, and agricultural land such as oil palm plantations. Whereas in the very dense density class, the NDVI value > 0.4, there are groups of trees with various types, mixed gardens, dryland agriculture and oil palm plantations.

According to Putra (2011) NDVI transformation is used to interpret and identify vegetation density through digital image interpretation [21]. High and low vegetation density can be determined using NDVI technology, which is a spectral sharpening image transformation that is used to analyze matters related to vegetation so that density class identification is obtained in West Binjai District and Binjai Kota District.

According to Purwanto (2015) the NDVI value obtained from image processing, the density class is divided into five classes, namely non-vegetation, rare, medium, dense and very dense classes.
Vegetation can be identified by using remote sensing by looking at the value of its vegetation index [22]. The vegetation index is a combination of red and infrared bands to identify the presence and condition of the vegetation, with three channels, namely green, red, and infrared. The 2015 vegetation density map in West Binjai District can be seen in Figure 6. Vegetation density distribution can be seen in Figure 7.

![Vegetation density distribution of West Binjai year 2015.](image1)

**Figure 6.** Vegetation density distribution of West Binjai year 2015.

![Vegetation density distribution of West Binjai year 2015.](image2)

**Figure 7.** Vegetation density distribution of West Binjai year 2015.

From Figure 7, it can be seen that in 2015 in West Binjai District, the largest NDVI value was in the range of 0.3 – 0.4, namely the dense class, while the smallest was in the range <0.1 from the non-vegetation class. The 2020 vegetation density map in West Binjai District can be seen in Figure 8. The distribution of the area can be seen in Figure 9.
From Figure 9, it can be seen that in 2020 in the West Binjai District, the largest NDVI value was obtained at high dense class, while the smallest was in the non-vegetation class. Where the District of West Binjai itself experienced a high dense increase of 270.72 ha. The village that experienced the highest increase in vegetation was Payaroba Village based on field checks, Payaroba Village was dominated by oil palm plantations and dryland agriculture. Even though Payaroba Village has a fairly high population, the community uses vacant land to become agricultural land so that the density class is high dense to increase from 2015 to 2020.

According to Sukristiyanti (2009) in land use NDVI is able to share density visualization well. However, the results of the vegetation density class information cannot be derived to read the type of land use [23]. For a low vegetation density class, it does not mean that the land use is in the form of
vacant land. From the results of field checks, non-vegetation class with NDVI values <0.1 in the field are found in buildings. A visual comparison of non-vegetation classes can be seen in Figure 10.

![Figure 10](image_url1)

**Figure 10.** Visualization of Non vegetation class in; (a) NDVI; (b) Google Earth; (c) field.

From the results of field checks, the sparse density class with NDVI values of 0.1 – 0.2 in the field there are settlements, dry land agriculture and some vegetation. A visual comparison of sparse density classes can be seen in Figure 11.

![Figure 11](image_url2)

**Figure 11.** Visualization of low dense class in; (a) NDVI; (b) Google Earth; (c) field.

From the results of field checks for medium density classes with NDVI values of 0.2 – 0.3 in the field there are settlements, cemeteries, and vegetation such as those in oil palm plantations and agricultural land. A visual comparison of sparse density classes can be seen in Figure 12.

![Figure 12](image_url3)

**Figure 12.** Visualization of medium dense class in; (a) NDVI; (b) Google Earth; (c) field.
From the results of checking the density class field with an NDVI value of 0.3 - 0.4 in the field there are grasslands, shrubs, and agricultural land such as oil palm plantations. A visual comparison of sparse density classes can be seen in Figure 13.

![Figure 13](image)

**Figure 13.** Visualization of dense class in; (a) NDVI; (b) Google Earth; (c) field.

From the results of field checks, the density class is very close with an NDVI value > 0.4. In the field there are groups of trees of various types, mixed gardens, dry land agriculture and oil palm plantations. A visual comparison of sparse density classes can be seen in Figure 14.

![Figure 14](image)

**Figure 14.** Visualization of high dense class in; (a) NDVI; (b) Google Earth; (c) field.

3.3. Changes in vegetation density area in the districts of West Binjai between 2015 and 2020

Based on the analysis of vegetation density, the largest area is a very dense density class. This is due to a large number of vegetation, such as agricultural land and mixed gardens that cover the existence of land, so that the area is very dense from 2015 to 2020 in West Binjai District and Binjai Kota District experiencing an increase in vegetation density. Changes in vegetation density in West Binjai District in 2015 and 2020 can be seen in Table 4.

| Vegetation density | 2015    | 2020    | Change  |
|--------------------|---------|---------|---------|
|                    | Area (Ha) | Area (%) | Area (Ha) | Area (%) | Area (Ha) | Area (%) |
| Non vegetation     | 0.90     | 0.06    | 10.56    | 0.75     | 9.66      | 0.68     |
The area of vegetation density in West Binjai District in 2015 with the highest area was found in the dense density class with an area of 580.69 ha (41.05%). In 2020 the density class decreased by 201.98 ha to 378.71 ha (26.77%).

Meanwhile, in the high dense class, there was an increase of 270.72 ha (19.13%) from the area in 2015 of 199.75 ha (14.12) and in 2020, it was 470.47 ha (33.26%). The vegetation density classes that experienced an increase were non-vegetation, low dense and high dense, while the vegetation density classes that experienced a decrease were medium and dense classes. These changes can be seen in Figure 15.

Based on Table 5, there were increases in the high dense and non-vegetation class, there was an increase where for the high dense class it was 58.03 ha (12.68%) from the area in 2015 of 64.95 ha (14.19) and in 2020 it was 122.98 ha (26.87%). Vegetation density classes that have decreased are low dense,
medium and dense.

3.4. Green open space analysis in West Binjai District and Binjai Kota District
Green open space is the most important part of the city. Green open space is a space that has not been determined in a certain area. Green open space has many benefits for urban areas, because it has many functions for the community, one of which can support community activities. Green open space usually takes the form of a city park or land decorated with plants or this facility is useful without damaging the green open space itself. Green open space is also used as a counterweight in development. If no city is built to balance green open space it may have unintended effects, and it will be difficult.

The role of green open space in the city is not directly very important for the development of sustainable urban areas. The implementation of green city development is one of the special steps taken by the government to meet the requirements of the Spatial Structural Law, especially spaces related to public green open space and private green open space [24]. Private Green Open Space (RTH) is a green open space owned by institutions or individuals such as yards, public or private buildings, rooftops. Public green space is in the form of sub-district parks, public cemetery, road green lanes, river borders.

3.5. Public cemetery
Funeral green space has many functions other than a burial place. Funeral bodies also have an ecological function as a water catchment and a place to grow vegetation. The cemetery belongs to the medium density class, the vegetation in the cemetery is mostly grass and other plants, other vegetation such as frangipani (Plumeria sp), banyan (Ficus benjamina), chocolate (Theobroma cacao), public cemetery can be seen in Figure 16.

3.6. Green lane road
The green lane is a side of the road that has vegetation with various functions, namely as reducing air pollution, road shade, noise silencer, as a shaper of city architecture, used as a dust barrier and city beauty, road green lanes are included in the medium density class. The trees commonly found in the West Binjai and Binjai Kota sub-districts as green roads are sunshade (Filicium decipiens), glodokan (Polyalthia longifolia), cape (Mimusop elengi), mahogany (Swietenia mahagoni), ketapang (Terminalia catappa), Angsana (Pterocarpus indicus). The green lane of the road can be seen in Figure 17.
3.7. River bank
The right and left of the river have a function as a buffer for river sustainability. Vegetation found on either side of the river in West Binjai District in the form of grass, bamboo (Bambusoidae sp), oil palm (Elaeis guineensis), banana (Musa paradisiaca), banyan (Ficus benjamina). River banks are classified as low dense, medium, dense and high dense classes because of different vegetation densities. The river banks can be seen in Figure 18.

3.8. Private green space
Private green open space is a green open space owned by individuals or agencies that have certain functions such as yards of people's houses and buildings planted with various vegetation. The yard is used for various activities. The yard of the house is included in the rare, medium, meeting, and very tight classes. The yards of residents' houses are dominated by multi-purpose tree species (MPTS) such as rambutan (Nephelium lappaceum), mango (Mangifera indica), guava (Syzygium aqueum). Private green space can be seen in Figure 19.
In conditions of limited open land area, green open space can take advantage of non-green open spaces, such as roofs of buildings or terraces of high-rise buildings, which usually occurs in urban areas in the city center or in areas with high population density with limited land. The vegetation that is often found on the rooftop is rambutan (Nephelium lappaceum), mango (Mangifera indica), guava (Syzygium aqueum) and some decorative plants. Roof top can be seen in Figure 20.

Settlements in the West Binjai Subdistrict has a fairly rapid development which has resulted in higher land requirements. Some people who have home gardens use it for green open spaces by planting various vegetation, which we often encounter in people’s homes are MPTS plants that produce fruit such as mango (Mangifera indica), water apple (Syzygium aqueum), guava (Psidium guajava), rambutan (Nephelium lappaceum), longan (Dimmocarpus longan), matoa (Pometia pinnata). People who do not have yards like those in urban areas usually use roof tops to plant vegetation and other plants.

According to Mala et al., (2018) improving the quality of the urban environment in terms of ecology, aesthetics and social [25]. From an ecological point of view, green open space can be used as a regulator of a cool urban microclimate. The vegetation formed by the forest is a natural component that can control the climate by controlling fluctuations or changes in the surrounding climate elements such as temperature, humidity, wind and rainfall.

Based on field data, green open space is spread at the level of low dense, medium, dense, and high dense vegetation. The need for green open space planning by optimizing its place and function, especially for locations with sparse vegetation. Maintenance of good vegetation can be maintained, especially for city parks. Tree planting should also be carried out on riverbanks to increase the protection function.
4. Conclusion
Between 2015 and 2020, the largest change in the area of vegetation density classes in West Binjai was an increase in the area of the high dense class to 19.13 percent. The sub-district contains green open spaces in the form of public cemeteries, green lanes on roads, river banks, and private green open spaces. These green open spaces were classified under low, medium, dense and high dense classes. There is a need to reorganize green open spaces, particularly those located in low-density areas. Tree replanting is also critical for improving the quality of the green space. Enhancing the quality of green space will result in an improvement in the quality of the environment.

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