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Characteristics Identification of Green Open Space in Kelurahan Manahan, Kota Surakarta

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***Abstract*—Green open space is an important component in the formation of a city. A city that has good green open space will make the city comfortable and beautiful. Kelurahan Manahan is one of the urban villages in Surakarta that has a large number of public green open spaces, both types and uses. Therefore, there needs to be a study related to characteristics identification of green open spaces in Kelurahan Manahan.**

The method used in this study is descriptive qualitative, by analyzing typology and morphology of green open space. The data collection process uses secondary data in the form of institutional data and related policies, while in the primary data interviews and observations are conducted.

The results of the study explain that the typology of green open space in Kelurahan Manahan is divided into public and private. The public green open space has a type of urban forest, city parks, green line, river border, railroad border, and field. While the typology of private green open space consists of green open spaces in offices, schools and home yards. The morphological analysis resulted in the spread of public green open spaces, while private green open spaces formed in clusters following settlement patterns.

Keywords—characteristics, identification, public green open space, private green open space

I. Introduction

Rapid population growth, especially in urban areas, will affect the development of a city. In its development, a city that meets the requirements of a decent life is a city whose development is carried out continuously and pay attention to the balance and the condition of the surrounding environment. One effort to realize the balance of the city is the existence of good green open space (RTH) planning. As part of the spatial plan, the RTH position will be the determinant of the balance of the environment and built environment because RTH is the lungs of the city. The city of Surakarta is one of the fastest growing cities in Indonesia, where the population in 2016 was 514,171 inhabitants with a city area of 4404.06 Ha, thus having an average population growth rate of 0.38% per year [1]. In its development, the people of Surakarta City have various diverse activities, one of which is the Sunday market which is held every Sunday morning in the Manahan Stadium area. This is in line with [2] which explained that Sub BWP I Region II Surakarta City is an area directed as a Sports, RTH and Education service center located in Manahan Village. So there needs to be a study on the identification of the characteristics of green open spaces in Manahan Village, Surakarta City. It is expected that the results of this study will be able to be an input into the development and utilization of environmentally sound space in the City of Surakarta.

The research methodology is a method taken in connection with research that will be carried out using systematic steps. According to [3], that conducting research aims to obtain facts about phenomena or other symptoms contained in society and obtain information that is more factual and systematic, with the aim of understanding a problem well. The method used in this study is descriptive qualitative, by analyzing typology and morphology of green open space. Where the analysis technique used is descriptive qualitative analysis to determine the characteristics of public and private green open space, which includes the type of green open space, type of vegetation, and the form of green open spaces in Manahan Village, and then the spatial analysis techniques used to view the open space distribution green. While the data collection process uses secondary data in the form of institutional data and related policies, while in the primary data interviews and observations are conducted.

II. results

Physically, green open space can be divided into natural green open spaces in the form of natural wild habitats, protected areas and national parks and non-natural green space or built such as parks, sports fields, cemeteries or green paths. In the space structure, green space can follow ecological patterns (grouping, elongated, scattered), as well as planological patterns that follow the hierarchy and structure of urban space, while ownership, green open space is divided into public green open space and private green open space

A. Public Green Open Space

Urban Forests

Based on the existing conditions, the existence of a green open space of public urban forests in the area of Manahan Village consisting of Urban Forest of Manahan Urban Forest and Manahan Urban Forest covering an area of 20 ha which has a green open space namely Cluster or clustered, because of its form clustered in an area with the type of vegetation in urban forests tends to almost the same

as the form of natural forests, namely large and tall trees. Whereas based on the structure, the urban forest found in Manahan Village includes those with a large number of urban forests consisting of vegetation communities in addition to consisting of trees and grasses, there are also shrubs and ground cover with irregular spacing. This type of vegetation such as in the Balekambang Urban Forests and Manahan Urban Forest which is intended as a recreational and tourism vehicle, is not only seen from the number of species, but more directed to educational purposes that have requirements such as trees must stand firm against the wind so as not to fall easily, trees have branches and branches that are not easily broken, have diverse leaves, and are able to serve as habitats and sources of food for wildlife, trees have a high adaptability to the natural environment, both in the dry season and or in the rainy season, infiltration of water into the soil or evapotranspiration. The types of vegetation contained therein include the Palm Tree of the Netherlands, Beringin, Glodogan, Angsana, Randu, Cemara, mahogany, kersen, cempaka, duwet, jackfruit, and red squirrel tails. The number reaches more than 100 trees with tight and irregular spacing. More details can be seen in table I. and figure 1.

TABLE I. URBAN FOREST CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Urban Forests	Belanda's sapodilla tree, Beringin, Glodogan, Angsana, Randu, pine, mahogany, kersen, cempaka , duwet, jackfruit, ekor tupai merah  *observation, 2018* **Ekor Tupai Merah**  *Observation, 2018* **Belanda's sapodilla**	Cluster	Located at city forest of Manahan's Stadium, City forest of Balaikambang's garden

Source: Analysis, 2018

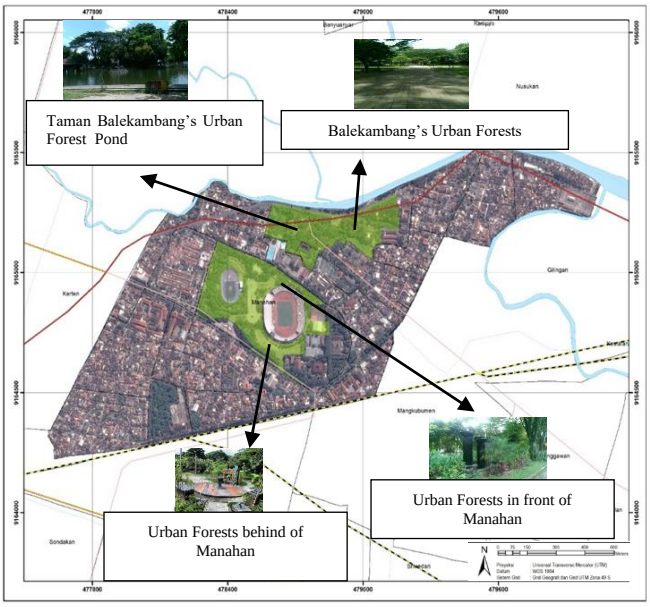

Fig. 1. Distribution of urban forests in Kelurahan Manahan *(Source: Analysis, 2018)*

City Park

Based on existing conditions, the City Park in Manahan Village, with an area of 4.06 ha, has a Scatter shape or spreads, because it is a green open space that does not have a specific pattern, with its vegetation growing spreading scattered in clumps or small bands.

The existence of a public green open space in the city park in Manahan Village consists of active city parks and passive city parks, but in Manahan Village more passive parks are available than active parks and are planted with various types of vegetation such as trees, bush shrubs and grass. One example of a city park in Manahan Village is the South Park and North Park GOR Manahan, where the park is an active public park, which is a park that can be used for playing, recreation, etc. that can be used by the general public. This park is located in the city center of Manahan Village with an area of 15. 762 m2. There are many activists in this park, including exercising, playing, and especially trading because during holidays GOR Manahan is always visited by the public for exercise and culinary centers. This can reduce the aesthetic value of the city park, but the government has provided special land around the city park in the form of a kiosk to trade, but still not enough for the number of existing traders so that the arrangement still seems not neat.

The type of vegetation of the city park has the criteria of plants, among other things not beregetah / toxic, the branches are not easily broken, the roots do not disturb the foundation, the structure of the leaves are half tight to tight, the type of height varies, the color green and varied other colors are balanced, the growth rate is medium, in the form of plant habitat local and cultivated plants, types of annual or seasonal plants, half-density plant spacing, types of

vegetation found in Manahan Village, among others Teh-tehan, Suplir, Kersen, Kenanga, Cempaka, Dadap. More details can be seen in table II and figure. 2.

TABLE II. CITY PARK CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
City Park	Perdu, Semak, Teh-Tehan, Pine, Kersen, Kenanga, Cempaka, Dadap	Scattered	Spread at Kelurahan Manahan

Source: Analysis, 2018

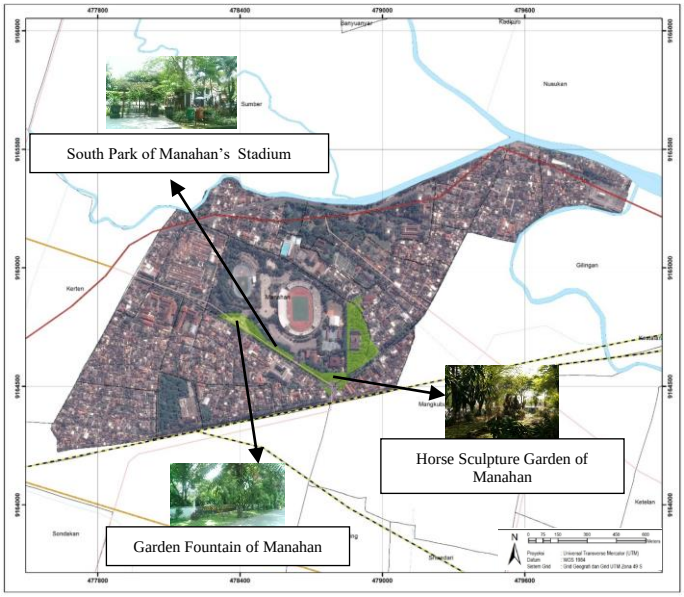

Fig. 2. Distribution of city park in Kelurahan Manahan *(Source: Analysis, 2018)*

Green Line

Based on existing conditions, the existence of a green strip public green open space in the area of Manahan Urban Village has an area of 6 ha consisting of RTH pedestrian paths, an island road park located in the middle of a crossroads, and a street corner park located on the side of a crossroads. RTH green lane road in Manahan Village, Surakarta City is along the main roads, which have a green open space that is Path or lane because it is in the form of a community pathway the vegetation grows on land in the form of a straight or curved path, following the road formation.

Vegetation criteria for green roadside plant pathways as shade and noise reducer must have 2m branching above the ground, the shape of the stem branching does not droop, mass of solid leaves and not easily collapsed as found in Manahan Village namely Angsana, Tanjung and Mahogany, for plants air pollution absorbers have criteria for tight spacing and solid leaf mass, such as those in Manahan Village namely Angsana, Bogenvil and Teh-tehan pangkas, for windbreakers have high crop criteria, dense leaf mass, planted in a row or form a tight mass and spacing <3m as found in Manahan Village namely Cemara and Mahoni. As for the limiting view found in Manahan Village, the bamboo tree. The type of vegetation of the Angsana tree (Pterocarpus indicus) is the type most commonly found in the research pathway. This is because angsana is considered as a protective tree that provides quite a lot of benefits and is classified as a fast growing plant. According to [4] angsana is easy to grow and grow big, its appearance as a protective tree is quite interesting. The leaves are fresh green and oval in shape. In addition, according to the [5] angsana (Pterocarpus indicus) planted on the road's green lane has the function of shade, pollution absorbers and wind breakers. According to the [6] there are some weaknesses of the angsana tree (Pterocarpus indicus) when planted in the green line, the roots are not strong and generally the branches are easily broken. In addition, according to [7] angsana leaves often fall out in the dry season so that it pollutes the road. Mahoni (Swietenia macrophylla) is the second largest type found in the research green line. Basically mahogany is also a plant that is suitable to be planted in the green lane of the road because it has strong roots and branches so it is not easily broken so it causes a sense of security and comfort for road users. This is consistent with the literature of [8] which states that mahogany is a suitable tree to be a protective tree because it has strong roots and branching. More details can be seen in table III and figure. 3.

TABLE III. GREEN LINE CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Green Line	Glodokan, Angsana, Bambu, Mangga, Mahoni, Tanjung, Bougenvil, Cemara, Teh-tehan, Cemara udang	Path	Located along the road: 1. JL. Menteri Supeno 2. JL. RM. Said 3. JL. Sam Ratulangi 4. JL. Ahmad Yani 5. JL. MT. Haryono 6. JL. Adi Sucipto 7. JL. Moh H.Thamrin

Source: Analysis, 2018

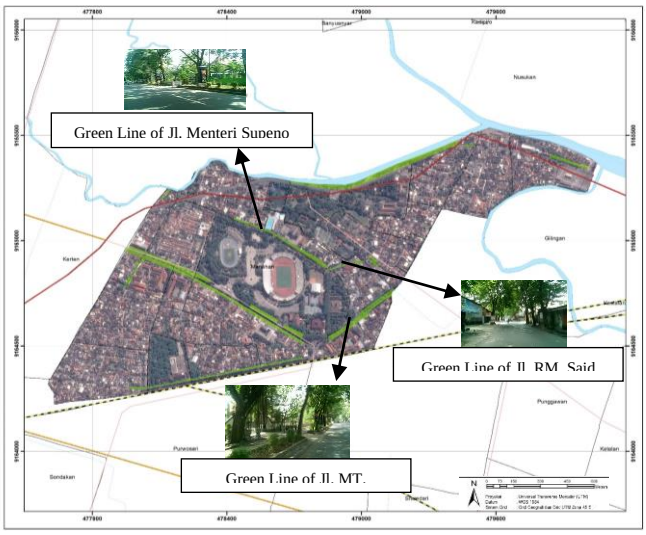

Fig. 3. Distribution of green line in Kelurahan Manahan *(Source: Analysis, 2018)*

Fig. 4. Distribution of river borders in Kelurahan Manahan *(Source: Analysis, 2018)*

River Borders

Based on existing conditions, the existence of public green open space RTH Sempadan Sungai in the area of Manahan Village has an area of 2.62 ha and has a green open space consisting of Path or path due to the community pathway vegetation grows on land in the form of a straight or curved path, following the formation of the river encourage the use of the area along the river as a border river.

RTH Sempadan Sungai in the area of Manahan Village consists of Bengawan Solo River and Pepe River which are rivers that cross the area of Manahan Village. RTH Green River border crossing in Manahan Village is in the form of a group of vegetation that grows naturally but develops wildly along the banks of rivers and banks of river embankments. Bordered river banks in urban areas are set at least 3 m on the outer side along the foot of the embankment, but land use at the banks of rivers that do not have green lines are dominated by land use in the form of settlements. More details can be seen in table IV and figure. 4.

TABLE IV. RIVER BORDERS CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
River Borders	Trembersi tree, scrub bush, and mixed vegetation	Path	Located along the river flow of Bengawan Solo's river

Source: Analysis, 2018

Railroads Borders

Based on the existing conditions, the presence of green open spaces is the Railway Railroad RTH in the area of Manahan Urban Village with an area of 890m2 that has a green open space, that is Path or path due to the path of the vegetation community growing on land that is in the form of a straight or curved path, following the formation of the railroad tracks. Provision of green open space on the border of railway lines to limit the interaction between community activities and railroad tracks. Utilization of a straight railroad road must have a border with a plant within a minimum of 11m and a minimum of 20 buildings, while for the inner curved railway line must have a border with a plant of at least 23m and a minimum building of 23m, but there are still many communities that utilize railroad boundaries for settlements and space to play for children so that it is very dangerous for safety. More details can be seen in table V and figure.5.

TABLE V. RAILROADS BORDERS CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Railroads Borders	scrub bush and mixed vegetation	Path	Located along railroads at Sam Ratulangi Street

Source: Analysis, 2018

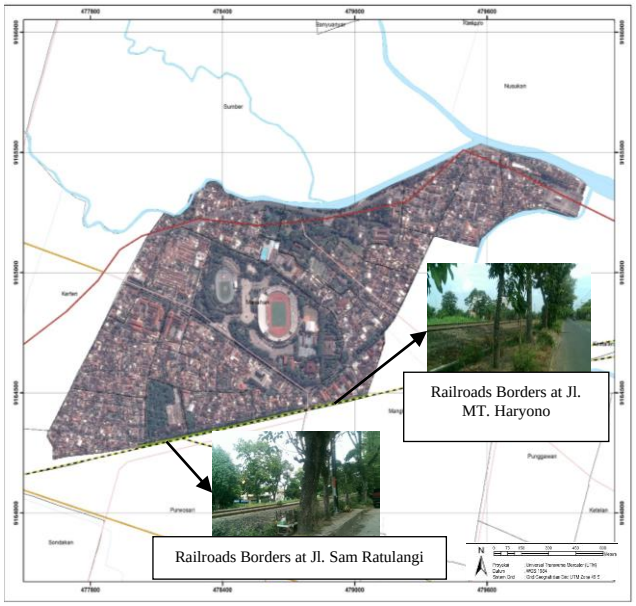

Fig. 5. Distribution of railroads borders in Kelurahan Manahan *(Source: Analysis, 2018)*

Sports Fields

Based on existing conditions, the presence of a public green open space in the Sports Field in the area of Manahan Urban Village covering an area of 7 ha consisting of a football field, badminton court, basketball court, tennis court, and veldrom located at Manahan Stadium, has a RTH form namely Cluster or grouping, because of its form clustered in an area. Types of vegetation Field Sports found in Manahan Village include trambesi trees, shrubs, and several types of shade trees. More details can be seen in table VI and figure.6.

TABLE VI. SPORTS FIELDS CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Sports Fields	Trembesi trees, shrubs and shade trees	Clustred	Located at Manahan's Stadium

Source: Analysis, 2018

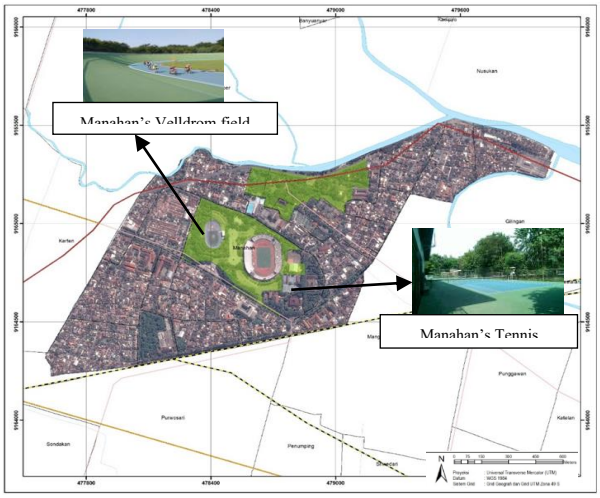

Fig. 6. Distribution of sports fields in Kelurahan Manahan *(Source: Analysis, 2018)*

B. Private Green Open Space

One of the private green open spaces in Manahan is a garden. Identification of the Garden Open Green Space (RTH) in the Manahan Village of Surakarta City based on the existing condition of an area of 24.6 ha which is grouped by type. The types of RTH are delivered consisting of rth yard which is classified into large house yard, medium house yard, small house yard, office yard and school yard.

Yard GOS located in Manahan village is dominated by green open space which is in the form of a group of vegetation in the home yard of each resident. Vegetation found in greenhouse gardens is usually like mango trees, banana trees, star fruit trees, and flower plants.

Fig. 7. Distribution of green open space type yard house in Kelurahan Manahan *(Source: Analysis, 2018)*

Large House Yard

In a large house with a minimum area of 500 m2, there are one to two protective trees in his yard, but there are still houses that do not have a protective tree. Inside the

house there is a yard that contains lots of ornamental plants and grass so as to provide aesthetic value.

TABLE VII. LARD HOUSE YARD CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Large house yard	There are existing vegetation, among others, having a minimum number of protective trees, such as: mango trees, star fruit trees, and flowering plants, elephant grass, Japanese grass	Clustered	The yard of the house, using soil media and flowerpot

Source: Analysis, 2018

Fig. 7. Green open space type large house yard in Kelurahan Manahan *(Source: Observation, 2018)*

Medium House Yard

In the medium house with an area between 200m2 and 500m2 there is 1 protective tree in the yard of his house, but there are still some houses that do not have a protective tree in his house.

TABLE VIII. MEDIUM HOUSE YARD CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Medium house yard	There are existing vegetation, among others, the number of 1-2 protective trees such as: mango trees, starfruit trees, and flowering plants, elephant grass, japanese grass	Clustered	The yard of the house, using soil media and flowerpot

Source: Analysis, 2018

Fig. 8. Green open space type medium house yard in Kelurahan Manahan *(Source: Observation, 2018)*

Small House Yard

In small houses with an area of less than 200 m2 most of them do not have a protective tree but on average have ornamental plants that are placed in pots, because the land area is very limited to planting large vegetation.

TABLE IX. SMALL HOUSE YARD CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Small house yard	Plants are usually in the form of grass in the yard and flower pots to make the yard of the house efficient	Clustered	Usually in the form of grass in the yard and flower pot to make the yard more efficient

Source: Analysis, 2018

Office yard and school yard

Manahan Village, which is centered as a sports area, green open space, and education has now developed into an office, shopping and business center. RTH for office, shopping, and business premises is usually in the form of road sidewalks and open parking areas.It is expected that this green space can absorb pollution and create O2, but the role of this green space is still not achieved because the type and size of vegetation in green open space is very influential. In terms of aesthetics, available open space still lacks aesthetic value because of its irregular arrangement. Vegetation or plants found are usually in the form of palm trees, bougainvillea, teh-tehan, etc.

TABLE X. OFFICE YARD and SCHOOL YARD CHARACTERISTIC IN KELURAHAN MANAHAN

Type of public GOS	Types of vegetation	Shape of public GOS	Location
Office yard and School yard	Trembesi trees, ornamental plants and shade trees, elephant grass,	Clustered	Usually the yard is located in the parking lane and open parking area

	Japanese grass		

Source: Analysis, 2018

Fig. 9. Green open space at office yard in Kelurahan Manahan *(Source: Observation, 2018)*

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