

Analysis of The Availability of Urban Green Open Space

Riyan Zainudin
Geography Education
Indonesia University of Education
Bandung, Indonesia
riyanzainudin@upi.edu

Mamat Ruhimat
Geography Education
Indonesia University of Education
Bandung, Indonesia
mamatruhimat@upi.edu

Abstract—This research aims to discover the availability of Urban Green Open Space in Muara Enim, South Sumatera, Indonesia. The research focus on the needs of oxygen for short, middle, and long periods of time. Research method that is used is qualitative descriptive. Data sources of this research were taken from field observation and documents from Development Planning Regional Agency, Environment Agency, Regional Water Supply Company, and Agency of Transportation and Traffic of Muara Enim District. Data collecting techniques used are observation and study of documentaton. The results show that the availability of Green Open Space has been enough to fulfill the needs for oxygen in short, middle, and long period of time. Henceforth, the community is expected to maintain the sustainability of the remaining forest.

Keywords—availability of open green space

I. INTRODUCTION

Urban area is an area with higher development level along with faster growth of population. This indirectly brings a decrease in urban environmental quality, such as low groundwater quality, high water pollution, and noise pollution. High frequency of flood in urban area is caused by water system disruption because of limited recharge area and high volume of surface flow. Rapid development in urban area causes degradation of urban environment because the land requirement level is increased. This will lead to uncontrolled development. Therefore, it is necessary to conduct an arrangement of urban environment that gives benefit ecologically, esthetically, and economically. The decrease in urban environment quality has a relation with the availability of Green Open Space. The Availability of Green Open Space in urban area could increase the quality of environment and give more comfort for urban population. According to the government's rule Law Number 26 of 2007 about space arrangement, a required area for Green Open Space is at least 30% of total urban area, which consists of 20% Public Area and 10% Private Area. Based on the data from Development Program of Green City Action Plan 2014 [1], the existing public Open Green Space in Muara Enim City has total area of (Public and Private) $\pm 288,5$

Ha or $\pm 6,7\%$ from total strategic urban area, which consists of Public Green Open Space: $\pm 162,9$ Ha or $\pm 3,78\%$ and Private Green Open Space: $\pm 125,6$ Ha or $\pm 2,91\%$. Based on the data, we can take a tentative conclusion that Muara Enim urban area has not fulfilled the minimum area of Green Open Space yet. Therefore, it is necessary to conduct a field research to see the availability of Green Open Space in Muara Enim urban area based on the oxygen needs for short period (this year/2016), middle period (5 years/2021), and long period (for the next 10 years /2026).

II. LITERATURE REVIEW

City is a place that is associated with the complexity of lining big stores, incredibly crowded traffic, and dense buildings [2]. [3] states that city is a center of creativity, culture, and hardwork of man. City is also a center place or branch of political and economical powers and becomes the drive of economic development and growth. When city becomes concrete forests, the availability of trees becomes a longing. When the earth is more barren, the greening is more required. [4] Greening is all the efforts to repair, taking care, and increase land condition to be optimally produced and functioned. [5] mentioned that, generally, the greening activity to form a green and beautiful city environment can be conducted in many ways, such as: 1) city forests; 2) public parks; 3) green road in public road; 4) greening of dense settlement with plant potted; and 5) greening of watershed. Greening is closely related to Green Open Space, because the main goal of Green Open Space is the increasing greening activity in urban area. According to [6], Urban Green Open Space is a part of open spaces in an urban area filled with plants and vegetation to support ecological, socio-cultural, and architectural function, which gives economic benefit and welfare for the society, such as: ecological function, socio-cultural function, economical function, and esthetical function. From the ownership aspect, Green Open Space is divided into public and private areas.

III. METHOD

Method of data collecting used in this research is qualitative descriptive. According to [7], qualitative descriptive research is a research that collects data in the form of words and pictures instead of numbers. The data in the form of numbers will be used only as supporting data. Data that has been obtained includes interview transcript, field notes, photos, and personal documents. Objects of this research are the sub-district/urban area of: Pasar I, Pasar II, Pasar III, Tungkal, Lubuk Ampelas, Tanjung Jati, and Muara Enim. The data sources of this research are: 1) field observation in Muara Enim urban area; 2) Development Planning Regional Agency of Muara Enim District; 3) Agency of Environment, Mining and Energy of Muara Enim District; 4) Regional Water Supply Company of Muara Enim District; 5) Agency of Transportation and Traffic of Muara Enim District; and 6) Statistic Center Agency of Muara Enim District.

Primary data collection was done by conducting a field observation with visualization technique to get the image of real research location, which supports the data from observation. Tools used in primary data collection is complete stationery, camera, and ArcGis, which is an application that supports in maps making. As the supporting research data, secondary data collection was obtained by analyzing documents from institution.

To discover the needs of green open space based on the oxygen needs in Muara Enim urban area, the data analysis technique used is Gerarkis method (1974), which have been modified in [8] in the following formula:

$$Lt = \frac{Pt + Kt + Tt}{(54)(0,9375)(2)} m^2$$

Source: [4]

- Lt : the area of City Green Open Space in year of t (m²)
- Pt : the amount of oxygen needs for population from year of t
- Kt : the amount of oxygen needs for motor vehicle in year of t
- Tt : the amount of oxygen needs for livestock in year of t
- 54 : a setting that shows that 1 m² of land area produces 54 gram of dried plant weight per day
- 0,9375 : a setting that shows that 1 gram dried plant weight equivalent with 0,9375 gram oxygen production
- 2 : total seasons in Indonesia

IV. RESULT AND DISCUSSION

This research was conducted in the sub-district/urban area of Muara Enim, located in the western area of Muara Enim District with total area of 185,91 square kilometers. It was located in lowland area with the elevation about 25–100 meters from sea level. In 2013, the amount of population in Muara Enim Sub-district is 66,53 thousands people (Muara Enim Sub-district in Numbers of 2014). After the researchers projected it with the rate of population growth, which is 2,9% per year, the amount of population in Muara Enim Sub-district for 2016 is 7.248.758 people. The picture below displays the Map of Green Open Space Types in Muara Enim Sub-district that describe the classification of Public Green Open Space, Private Green Open Space, and Non Green Open Space, with details of Public Green Open Space area of 1.736,61 hectare, Private Green Open Space area of 129,73 hectare, and Non Green Open Space area of 2.226,36 hectare.

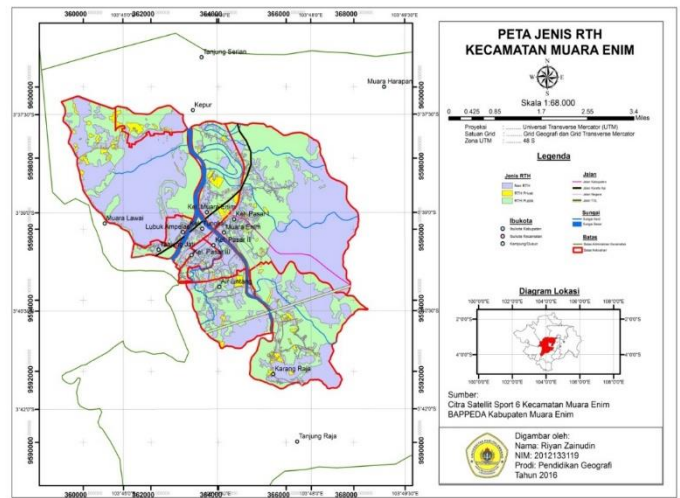


Fig. I. Map of Green Open Space Classification in Muara Enim Sub-district

This research aims to discover the width area of Green Open Space needed to fulfill the oxygen needs in Muara Enim for the next three periods of time. The researchers used Gerarkis method with this formula:

$$Lt = \frac{Pt + Kt + Tt}{(54)(0,9375)(2)} m^2$$

Source: [4]

Pt is the amount of oxygen needs for population. To find it out, the amount of population needs to be found first, then it will be multiplied with 840. 840 is the standardized amount of oxygen consumption of human/day. This information is obtained from the guide book of Green Open Space supply in urban area. The researchers display table I that describes the amount of oxygen consumption per day of population in Muara Enim Sub-district in 2016, 2021, and 2026.

TABLE I. NEEDS OF OXYGEN/DAY OF POPULATION IN MUARA ENIM SUB-DISTRICT IN 2016, 2021, AND 2026

Year	Amount of Population	Oxygen Consumption of Human/day (gram/day)	Oxygen Consumption (gram/day)
2016	7.248.758 people	840	6.088.956.720
2021	8.353.355 people		7.016.818.200.
2026	9.647.557 people		8.103.947.880

Kt is the amount of oxygen needs for motor vehicle. According to data obtained from Agency of Transportation and Traffic of Muara Enim District, the amount of oxygen needs for motor vehicle in Muara Enim Sub-district can be seen from this table II.

TABLE II. OXYGEN NEEDS FOR MOTOR VEHICLE IN AREA OF MUARA ENIM SUB-DISTRICT

Vehicle Types	Average Daily Traffic (vehicle/day)	Oxygen Needs (gram/day)	Total of Oxygen Needs (gram/day)
Private Car	5.608	11.634	65.243.472
Motorcycle	4.456	582	2.593.392
Truck	147	29760	4.374.720
Bus	48	45760	2.196.480
Total amount			74.408.064

Source: Agency of Transportation and Traffic of Muara Enim District.

The oxygen needs for motor vehicle in urban area of Muara Enim is 74.408.064 gram/day. Therefore, the required area of Green Open Space in Muara Enim Sub-district in 2016 is :

$$\begin{aligned}
 & \text{Width area of Green Open Space} \\
 &= \frac{6.088.956.720 + 74.408.064}{(54)(0,9375)(2)} \text{ m}^2 \\
 &= 60.872.738,60 \text{ m}^2
 \end{aligned}$$

Width area of Green Open Space = 608,72 ha

**Notes: oxygen needs for livestock (Tt) were neglected.*

In 2016, Muara Enim urban area needs green open space area of 608.72 ha. Based on the result of observation and digitation on Muara Enim sub-district using ArcGis application, the area of Green Open Space in the sub-district is 1.866,34 Ha. It means that for 2016, the needs of Green Open Space in Muara Enim Sub-district has already been fulfilled, and exceeds about 306% from the total required Green Open Space area. The researchers conducted the same thing to discover width area needed by Muara Enim Sub-district in the next five years, which is 2021. To fulfil oxygen needs in 2021, the minimum width area needed for Green Open Space is 700,37 ha. The results show that current width area of Green Open Space in Muara Enim Sub-district is 1.866,34 ha. This means that the needs of Green Open Space in Muara Enim Sub-district for 2021 will still be fulfilled, and it exceeds about 266% from the needed area of Green Open Space. For the next ten years, which is 2026, Muara Enim Sub-district needs Green Open Space area of 807,74 ha to fulfil the oxygen needs for population that keeps increasing. The amount of needed Green Open Space area in

2026 will be fulfilled since the current amount of Green Open Space of Muara Enim Sub-district is 1.866,34 ha. That condition is a sign that in 2026, the Green Open Space in Muara Enim will exceed about 231% from the total required area of Green Open Space. Based on the findings, it can be concluded that the current availability of Green Open Space in Muara Enim Sub-district can fulfil the width area of Green Open Space that is needed to produce oxygen or fresh air until the next 10 years.

Hopefully, the remaining forest in this area can be preserved. The paper conceptualizes smartness and argues that ICT, leadership, innovation, and social capital supported by human capital are the core components of smartness [9]. The existence of green open space can give positive impact for human activities. The most frequently reported scams in the capital Beijing were linked to the chaotic environment at tourist attractions and the misbehaviours of tour agents [10].

V. CONCLUSION

The width area of the existing Public Green Open Space in Muara Enim urban area, which is based on the Program of Green City Development (P2KH) Planning Action of Green City (RAKH) 2014 Muara Enim City, is ± 288,5 Ha (6,7% from width of strategic urban area). While based on the results of identification in field and digitizing using ArcGis, the width area of the existing Public green open space of Muara Enim Sub-district is ± 1.866,34 Ha (34% from total of strategic urban area), which consists of Public Green Open Space of 1.736,61 ha and Private Green Open Space of 129,73 ha. This means that the current urban area of Muara Enim has already fulfilled the minimum requirement of green open space availability. The result also shows that the availability of Green Open Space in the urban area is enough to fulfill the needs of oxygen for three periods of time or at least for the next ten years.

REFERENCES

- [1] Dinas Kependudukan dan Pencatatan Sipil Kabupaten Muara Enim, *Buku Profil Perkembangan Kependudukan Kabupaten Muara Enim Tahun 2014*. Indonesia, 2014.
- [2] H. S. Yunus, *Manajemen Kota Perspektif Spasial*. Yogyakarta: Pustaka Pelajar, 2005.
- [3] E. Budihardjo, *Kota dan Lingkungan Pendekatan Baru Masyarakat Berwawasan Ekologi*. Jakarta: Pustaka LP3ES Indonesia, 2015.
- [4] I. Djamal and Zoer'aini, *Prinsip-prinsip Ekologi Ekosistem, Lingkungan dan Pelestariannya*. Jakarta: PT Bumi Aksara, 2010.
- [5] Nazaruddin, *Penghijauan Kota*. Jakarta: PT Penebar Swadaya, 1994.
- [6] Departemen Pekerjaan Umum Ditjen Penataan Ruang, *Peraturan Menteri Pekerjaan Umum No. 05/PRT/2008 tentang Pedoman Penyediaan Dan Pemanfaatan RTH di Kawasan Perkotaan*. Indonesia, 2008.
- [7] S. Denim, *Menjadi Peneliti Kualitatif*. Bandung: CV. Pustaka Setia, 2002.
- [8] S. P. C. Wisesa, "Studi Pengembangan Hutan Kota di wilayah Kotamadya Bogor," Bogor Agricultural University, 1988.
- [9] K. Boes and B. Dimitries, "Smart tourism destinations : ecosystems for tourism destination competitiveness," *Int. J. Tour. Cities*, vol. 2, no. 2, pp. 108–124, 2016.
- [10] J. Li and P. Pearce, "Tourist scams in the city : challenges for domestic travelers in urban China," *Int. J. Tour. Cities*, vol. 2, no. 4, pp. 294–308, 2016.