Jurnal Teknik Sipil & Perencanaan 25 (2) (2023) p 199 - 210

JURNAL TEKNIK SIPIL & PERENCANAAN

10.15294/jtsp.v25i2.47047

Identification of Potential Land Locations for Green Open Space in Cirebon City Center (Case study: Pekalipan, Kesambi, and Kejaksan Districts)

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Abstract. Society cannot ignore the rapid growth of Cirebon city, as evidenced by the population growth rate, which has increased by 2.91% per year compared to the surrounding area. This growth is expected to lead to an increase in built-up land and a reduction in green open spaces in Cirebon City, amounting to approximately 10.5%. This decline green space can increase urban temperatures, especially in Cirebon City. This study focuses on identifying potential locations for green open space from the macro scale of Cirebon City to the microscale in the city center. The analysis reveals a rise in temperature in the city center, with temperatures generally decreasing from the center to the periphery. Surface temperatures have shown an increase from 2015 to 2021, rising from 30.64°C in 2015 to 32.65°C in 2021. The main objective of this study is to identify potential green open space locations in Cirebon City Center. This research employs a quantitative, descriptive, and spatial approach, involving data collection through field observations and literature studies. The research methodology includes the utilization of remote sensing technology to process Landsat 8 images, which aids in the identification of potential green open space locations. The study results indicate that there is an area of 8.02 hectares, or 1.16%, that aligns with the Regional Detail Spatial Plan (RDTR) but necessitates efforts to enhance the quality of green open spaces through methods such as design, management, and community participation. Additionally, there is an area covering 681.42 hectares, not covered by the RDTR, which is a priority for greening through the implementation of green infrastructure.

Keywords: Cirebon City, Urban Heat Island, Green Open Space

INTRODUCTION

According to the Law of the Republic of Indonesia, Number 26 of 2007, concerning Spatial Planning, Green Open Space refers to open areas used for plant growth, naturally and through planting. The presence of Green Open Space in urban areas has a vital role in creating a comfortable urban environment for the community. The government has mandated that a minimum of 30% of the total urban area be allocated as Green Open Space, divided into 20% for public and 10% for private use. This presents one of the challenges faced by Cirebon City, a rapidly growing city in West Java that requires significant efforts to meet the potential land allocation requirements for Green Open Space [1].

The Cirebon City Medium-Term Development Plan 2018 – 2023 underscores the rapid growth of Cirebon City, which serves as the central region for Indramayu, Majalengka, and Kuningan. Consequently, built-up land in Cirebon City has reached 55%, and the Population Growth Rate has increased by 2.91% annually compared to the surrounding areas [2]. This situation has led to a shortage of Green Open Space in Cirebon City, which currently stands at only 9.4% of the ideal target of 20%. This deficit results in a Green Open Space shortage of approximately 10.5%. The scarcity of Green Open Space is expected to contribute to the rise in urban temperatures or the Urban Heat Island (UHI) phenomenon, especially in Cirebon City [3]. UHI occurs when air temperatures in the city center surpass those in the surrounding areas [4]. To detect UHI, several approaches have been employed, including the utilization of Geographic Information System (GIS) technology [5].

By using the application of geographic information systems, this study aims to provide a more detailed By employing GIS technology, this study aims to provide a more comprehensive analysis of the identification of potential land locations for Green Open Space, which was initially approached at a macro level across Cirebon City but is now focused on a micro-scale examination of the city center, including Pekalipan, Kesambi, and Kejaksan Districts. Average temperature data reveals a significant temperature increase in the city center (Pekalipan, Kesambi, and Kejaksan districts), with temperatures gradually decreasing from the city center towards the suburbs (Lemahwungkuk and Harjamukti districts). Additionally, there is an observable pattern of rising surface temperatures from 2015 to 2021. In 2015, the highest recorded temperature reached 30.64°C, whereas in 2021, the highest temperature increased to 32.65°C [6]. Consequently, more detailed micro-scale research is imperative to identify priority zones for expanding Green Open Space and mitigating the effects of UHI within the Regional Detail Spatial Plan (RDTR) of Cirebon City, particularly in Cirebon City Center, which encompasses the Pekalipan, Kesambi, and Kejaksan Districts. The determination of potential areas for Green Open Space land is conducted through the application of Landsat 8 remote sensing satellite image data using parameters such as the Normalized Difference Vegetation Index (NDVI), Temperature Heat Index (THI), and population density [7].

RESEARCH METHODOLOGY

The methodology of this study uses Landsat 8 imagery processed through remote sensing to determine the potential location of Green Open Space in the center of Cirebon City (Pekalipan, Kesambi, and Kejaksan Districts). Parameters such as vegetation density level, comfort index level, and population density level are used in determining potential locations for Green Open Space potential land. The data sources encompass the RBI map of Cirebon City (Scale 1:25,000), Landsat 8 Satellite Imagery acquired on December 17, 2022, featuring a cloud cover of 10%, along with data on population, climate, land cover, and the Cirebon City Regional Detail Spatial Plan (RDTR) Map.

This research encompasses quantitative, descriptive, qualitative, and spatial methodologies. Data collection involves two approaches: primary data obtained from field observations and secondary data retrieved from existing literature. The analysis includes assessments of vegetation density, comfort index, population density, prioritization, potential Green Open Space location areas, and suitability analysis for highly prioritized zones, as well as the determination of potential Green Open Space sizes within the center of Cirebon City (Pekalipan, Kesambi, and Kejaksan Districts) based on the Cirebon City RDTR Map. Further details concerning the forthcoming analyses in this study are provided below.

Vegetation Density Level

In processing the value of the Normalized Difference Vegetation Index (NDVI) or the level of vegetation density, the method used uses data from two bands in the Landsat 8 image, namely band 4 (red) and band 5 (near infrared). Both bands were chosen because measurements are affected by light absorption by green vegetation. The results of the NDVI calculation were then classified by classification class of vegetation density level. Here is the formula for calculating the level of vegetation density and its classification class [8], [9].

$$\text{NDVI} = \frac{(\text{band 5 (NIR)} - \text{band 4 (RED)})}{(\text{band 5 (NIR)} + \text{band 4 (RED)})}$$

TABLE 1. Vegetation Density Class.

No	NDVI Class	Information
1.	0,01 – 0,18	scarce vegetation
2.	0,18 – 0,32	rare vegetation
3.	0,32 – 0,42	moderate condition vegetation
4.	0,42 – 0,47	dense vegetation
5.	≥ 0,47	very dense vegetation

Comfort Level of Index

In processing the Temperature Heat Index (THI) value or comfort index level, the method used is to calculate the estimated value of Land Surface Temperature (LST) and relative humidity. Land Surface Temperature estimates are based on processing Landsat 8 imagery using data from bands 10 and 11. Meanwhile, to obtain the distribution of relative humidity, data obtained from BMKG Station [10] were used. Below is a THI calculation formula that can be implemented in the Nieuwolt equation [11].

$$THI = \left(0{,}8 \times T + \left(\frac{RH \times T}{500}\right)\right)$$

THI classification refers to the Emmanuel, 2005 study that has adjusted THI cut-off values for the tropics [12]. The advantage of the THI method lies in its simple calculation because it only uses 2 parameters, namely land surface temperature and relative humidity. In addition, the data needed is easily obtained from the station of the Meteorology, Climatology, and Geophysics Agency [13].

TABLE 2. Comfort Index Level Class.

No	Temperature Heat Index value (°C)	Information
1.	≤ 24	Comfortable Conditions
2.	25 – 27	Uncomfortable Conditions
3.	≥ 27	Uncomfortable Conditions

Population Density

Population data is sourced from BPS Cirebon City to calculate population density at the most granular level, which is per kelurahan within Cirebon City Center. This information will be represented in polygon form and subsequently analyzed using ArcGIS software to assess population density. The following is a breakdown of population density classifications per square kilometer:[14].

TABLE 3. Population Density Class.

No	Population Density Class	Information
1.	Population Density ≤ 500	Very Low Density
2.	Population Density 501 – 1.500	Low Density
3.	Population Density 1.501 – 2.500	Medium Density
4.	Population Density 2.501 – 5.000	Densely Populated
5.	Population Density ≥ 5.000	Very Densely Populated

Prioritization and Extent of Potential Green Open Space Locations

In assessing the need for an expanded Green Open Space, a study employing an overlay procedure combines multiple factors to evaluate the extent of Green Open Space requirements. This overlay procedure leverages ArcGIS software, incorporating tools for overlaying NDVI, THI, and population density maps. Furthermore, this overlay process assigns specific weights to discern the potential for green open spaces in Cirebon City. The subsequent step is the establishment of overlay weighting criteria to promote more effective fulfillment of green open space requirements. The following outlines the criteria for overlay weighting to prioritize potential Green Open Space locations: [7].

TABLE 4. Prioritization of Green Space Weighting.

No.	Variable	Criterion	Score
1.	Normalized Difference Vegetation Index	very rare vegetation	1
		rare vegetation	2
		moderate condition vegetation	3
		dense vegetation	4
		very dense vegetation	5
2.	Temperature Heat Index	≤ 24°C	1
		24 – 27°C	3
		≥ 27°C	5
3.	Population Density	Population Density ≤ 500	1
		Population Density 501 – 1.500	2
		Population Density 1.501 – 2.500	3
		Population Density 2.501 – 5.000	4
		Population Density ≥ 5.000	5

The Suitability of The Zone is a priority and The Area of Potential Locations of Green Open Space with RDTR Cirebon City.

In knowing the suitability, identifying zones for green open space needs is carried out following the Detailed Spatial Plan (RDTR) of the Cirebon City area.

RESULT AND DISCUSSION

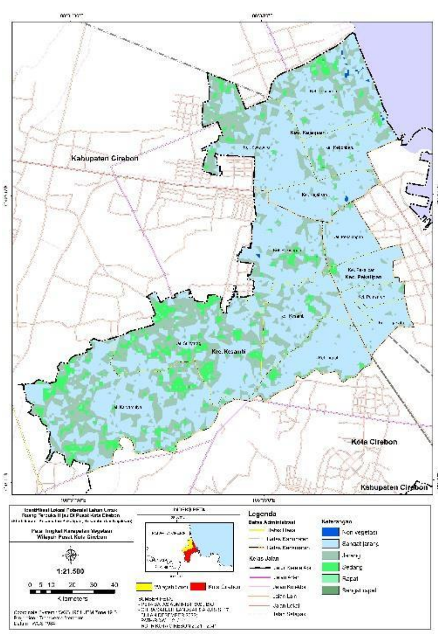
Vegetation Density Analysis

The level of vegetation density or NDVI value in Cirebon City Center is dominated by a very sparse vegetation density level, covering an area of 951.99 ha or 65.22% of the total area. Meanwhile, vegetation density is very dense, only covering an area of 0.50 ha or 0.03% of the total area. The area of non-vegetation, commonly called water bodies has an area of 1.89 ha or 0.13% of the entire area. Information regarding the results of NDVI level classification in Cirebon City Center can be found in the table and figure below.

TABLE 5. Classification of Vegetation Density Level of Cirebon City Center Area.

Region	NDVI classification (Ha)											
	Nonvegetation	**%**	**Very tight**	**%**	**Meeting**	**%**	**Keep**	**%**	**Infrequently**	**%**	**Very rare**	**%**
Kejaksan	**1,62**	**0,11**	**0,18**	**0,01**	**1,02**	**0,07**	**17,19**	**1,18**	**117,76**	**8,07**	**303,95**	**20,82**
Kebonbaru	0,22	0,05	0,09	0,02	0,18	0,04	2,46	0,56	12,73	2,88	58,11	13,16
Kejaksan	0,33	0,07	-	-	0,09	0,02	0,48	0,11	5,67	1,28	59,56	13,48

Region	NDVI classification (Ha)											
	Nonvegetation	%	**Very tight**	%	**Meeting**	%	**Keep**	%	**Infrequently**	%	**Very rare**	%
Kesenden	1,08	0,24	0,09	0,02	0,69	0,16	7,33	1,66	44,28	10,03	92,71	20,99
Sukapura	-	-	-	-	0,06	0,01	6,92	1,57	55,09	12,47	93,57	21,18
Kesambi	**0,21**	**0,01**	**0,32**	**0,02**	**5,41**	**0,37**	**80,44**	**5,51**	**272,25**	**18,65**	**501,67**	**34,37**
Drajat	-	-	-	-	-	-	3,15	0,37	12,13	1,41	77,27	8,98
Karyamulya	-	-	0,17	0,02	2,53	0,29	36,01	4,19	114,30	13,29	162,78	18,92
Kesambi	-	-	-	-	0,27	0,03	2,96	0,34	25,27	2,94	72,22	8,39
Pekiringan	0,21	0,02	0,15	0,02	0,27	0,03	5,63	0,65	29,99	3,49	89,57	10,41
Sunyaragi	-	-	-	-	2,33	0,27	32,69	3,80	90,56	10,53	99,83	11,60
Pekalipan	**0,06**	**0,00**	**-**	**-**	**0,19**	**0,01**	**1,92**	**0,13**	**9,16**	**0,63**	**146,38**	**10,03**
Jagasatru	-	-	-	-	-	-	-	-	1,34	0,85	33,69	21,36
Pekalangan	0,02	0,01	-	-	0,09	0,05	0,81	0,51	3,78	2,40	44,36	28,13
Pekalipan	0,04	0,02	-	-	0,11	0,07	0,96	0,61	2,13	1,35	39,15	24,83
Pulasaren	-	-	-	-	-	-	0,15	0,10	1,92	1,22	29,17	18,50
Total	1,89	0,13	0,50	0,03	6,63	0,45	99,56	6,82	399,18	27,35	951,99	65,22

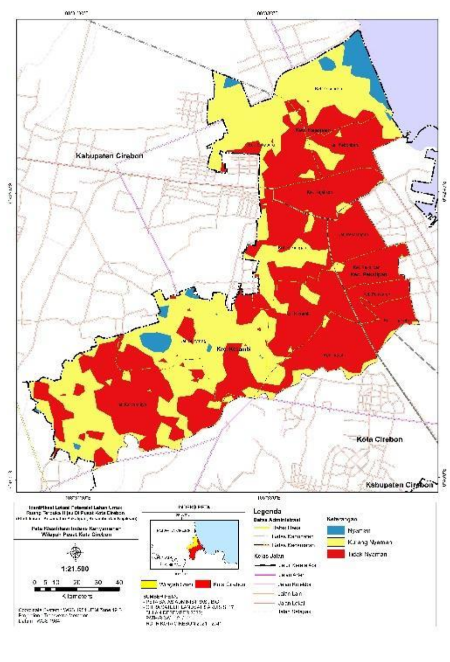


Comfort Index Analysis

The comfort index level or THI value in Cirebon City Center is between 18.00 °C to THI 30.00 °C. The comfort index level of downtown Cirebon City is dominated by uncomfortable comfort level with THI value > 27 °C with an area of 828.05 Ha or 56.69% of the total area. The comfortable level in Cirebon City Center only has an area of 50.59 ha or 4.46% of the total area located in a small part of Kejaksan and Kesambi Districts. The results of THI classification in Cirebon City are explained in the table and figure below.

TABLE 6. Classification of Comfort Index of Cirebon City Center Area.

Region	THI classification					
	Comfortable	%	**Less Comfortable**	%	**Uncomfortable**	%
Kejaksan	**34,53**	**2,36**	**205,89**	**14,09**	**201,68**	**13,81**
Kebonbaru	0,71	0,16	18,36	4,15	54,70	12,37
Kejaksan	-	-	1,97	0,44	64,33	14,55
Kesenden	31,48	7,12	88,85	20,10	26,08	5,90
Sukapura	2,34	0,53	96,71	21,88	56,57	12,80
Kesambi	**16,06**	**1,10**	**371,67**	**25,44**	**473,10**	**32,39**
Drajat	-	-	15,79	1,83	76,87	8,93
Karyamulya	1,01	0,12	146,09	16,97	169,05	19,64
Kesambi	-	-	17,73	2,06	82,99	9,64
Pekiringan	-	-	48,24	5,60	77,51	9,00
Sunyaragi	15,05	1,75	143,82	16,71	66,69	7,75
Pekalipan	**-**	**-**	**4,56**	**0,31**	**153,26**	**10,49**
Jagasatru	-	-	1,42	0,90	33,62	21,30
Pekalangan	-	-	1,37	0,87	47,80	30,28
Pekalipan	-	-	1,73	1,10	40,61	25,73
Pulasaren	-	-	0,04	0,02	31,23	19,79
Total	**50,59**	**3,46**	**582,12**	**39,85**	**828,05**	**56,69**

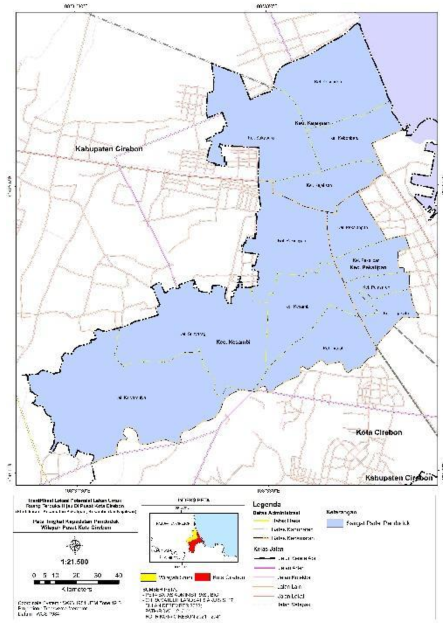


Population Density Analysis

A very dense population density class dominates the population density in Cirebon City Center. Meanwhile, Karyamulya Village in Kesambi District is the only area with the most significant area that is included in the very dense population density class, with an area of 318.78 people / km². More information about the classification of population density levels in Cirebon City Center can be found in the table below.

TABLE 7. Classification of Population Density in Cirebon City Center.

District	Neighborhoods	Population Density (Inhabitants/km2)		Density Level
		Broad	**%**	
Kejaksan		**444,88**	**30,27**	
	Kebonbaru	74,10	16,73	Very densely populated
	Kejaksan	66,38	14,99	Very densely populated
	Kesenden	147,08	33,21	Very densely populated
	Sukapura	157,32	35,52	Very densely populated
Kesambi		**866,20**	**58,93**	
	Drajat	93,52	10,87	Very densely populated
	Karyamulya	318,73	37,05	Very densely populated
	Kesambi	100,72	11,71	Very densely populated
	Pekiringan	126,47	14,70	Very densely populated
	Sunyaragi	226,76	26,36	Very densely populated
Pekalipan		**158,68**	**10,80**	
	Jagasatru	35,37	22,29	Very densely populated
	Pekalangan	49,33	31,09	Very densely populated
	Pekalipan	42,61	26,85	Very densely populated
	Pulasaren	31,37	19,77	Very densely populated



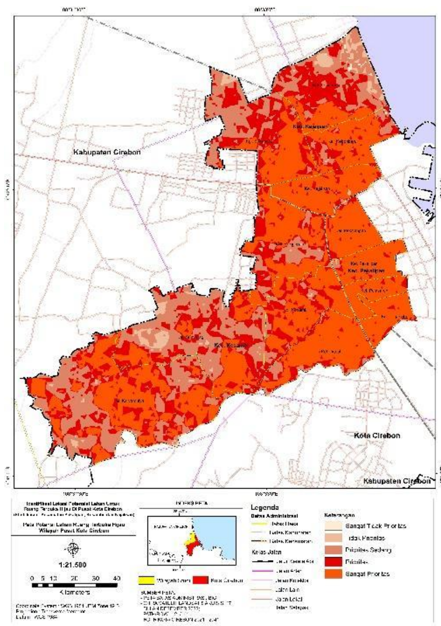
Analysis of Priority Determination and Extent of Potential Green Open Space Locations

In determining the potential of Green Open Space land, it was found that in Cirebon City Center, the high-priority class dominated with a percentage of 48%. Kesambi District has the most with a rate of 25.69%, followed by Kejaksan District with 12.44% as the second most, and Pekalipan District has the lowest percentage of 9.87%. Meanwhile, classes that are not very priority are only found in Kejaksan District with an area of 1.20 ha, located in Kebonbaru and Kesenden Villages. More complete information on the priority classification and measurement of potential Green Open Space locations can be found in the table below.

TABLE 8. Classification of Comfort Index of Cirebon City Center Area.

Region	GREEN OPEN SPACE Land Potential Classification (Ha)										Total
	Very Not a Priority	%	**No Priority**	%	**Medium Priority**	%	**Priority**	%	**Very Priority**	%	
Kejaksan	**1,20**	**0,08**	**15,64**	**1,07**	**118,80**	**8,16**	**123,72**	**8,50**	**181,09**	**12,44**	**440,45**
Kebonbaru	0,18	0,04	0,29	0,06	8,99	2,04	16,21	3,68	47,91	10,88	73,58
Kejaksan	-	-	0,33	0,08	0,95	0,22	6,34	1,44	58,46	13,27	66,09
Kesenden	1,02	0,23	12,79	2,90	56,23	12,77	50,80	11,53	25,00	5,68	145,85
Sukapura	-	-	2,24	0,51	52,63	11,95	50,37	11,44	49,71	11,29	154,94
Kesambi	**-**	**-**	**15,82**	**1,09**	**248,46**	**17,06**	**219,87**	**15,10**	**374,14**	**25,69**	**858,29**
Drajat	-	-	-	-	8,14	0,95	14,25	1,66	69,79	8,13	92,17
Karyamulya	-	-	3,24	0,38	104,55	12,18	83,03	9,67	124,01	14,45	314,83
Kesambi	-	-	0,27	0,03	8,73	1,02	28,24	3,29	63,48	7,40	100,72
Pekiringan	-	-	0,54	0,06	24,77	2,89	33,77	3,93	66,46	7,74	125,54

Region	GREEN OPEN SPACE Land Potential Classification (Ha)										Total
	Very Not a Priority	%	No Priority	%	Medium Priority	%	Priority	%	Very Priority	%	
Sunyaragi	-	-	11,77	1,37	102,28	11,92	60,58	7,06	50,39	5,87	225,02
Pekalipan	**-**	**-**	**0,22**	**0,02**	**2,02**	**0,14**	**11,46**	**0,79**	**143,64**	**9,87**	**157,35**
Jagasatru	-	-	-	-	0,11	0,07	2,52	1,60	32,24	20,49	34,87
Pekalangan	-	-	0,08	0,05	0,75	0,48	4,45	2,83	43,74	27,80	49,02
Pekalipan	-	-	0,14	0,09	1,16	0,73	2,39	1,52	38,53	24,49	42,22
Pulasaren	-	-	-	-	-	-	2,10	1,33	29,13	18,51	31,23
Total	**1,20**	**0,08**	**31,68**	**2,18**	**369,28**	**25,36**	**355,05**	**24,38**	**698,87**	**48,00**	**1456,08**



The Suitability of The Zone is Very Priority and The Area of Potential Locations of Green Open Space with RDTR Cirebon City

In assessing the potential suitability of Green Open Space, especially within the very priority zone outlined in the RDTR of Cirebon City, it was observed that Cirebon City Center was predominantly occupied by classes not in compliance with the RDTR design. Specifically, this non-compliant area covered 681.42 hectares, accounting for 98.84% of the total Green Open Space very priority zone area. In contrast, the portion adhering to the RDTR design constituted a mere 8.02 hectares or 1.16% of the Green Open Space priority zone area. For more comprehensive information concerning the identification of the suitability of Green Open Space priority zones within the Cirebon City Center area, please refer to the table below.

TABLE 9. Identification of Green Space Priority Zone Suitability with RDTR of Cirebon City Center Area.

RDTR Space Pattern Suitability	Area (Ha)	Proportion (%)	Total (Ha)
Appropriate	**8,02**	**1,16**	
Green Line	3,21	39,99	3,21
Funeral	0,45	5,57	0,45
District Park	0,24	2,93	0,24
Village Park	0,52	6,44	0,52
City Park	0,99	12,35	0,99
RW Park	2,63	32,77	2,63
Not Compliant	**681,42**	**98,84**	
Road Agency	67,35	9,88	67,35
Heritage	0,73	0,11	0,73
City-scale Trade and Services	44,74	6,57	44,74
Trade and Services SWP Scale	68,49	10,05	68,49
WP Scale Trade and Services	35,47	5,20	35,47
Office	18,45	2,71	18,45
Defense and Security	0,50	0,07	0,50
Medium Density Housing	87,70	12,87	87,70
High-Density Housing	317,17	46,54	317,17
SPU District Scale	8,38	1,23	8,38
SPU Village Scale	9,01	1,32	9,01
City Scale SPU	20,93	3,07	20,93
Transportation	2,52	0,37	2,52
		Total	**689,45**

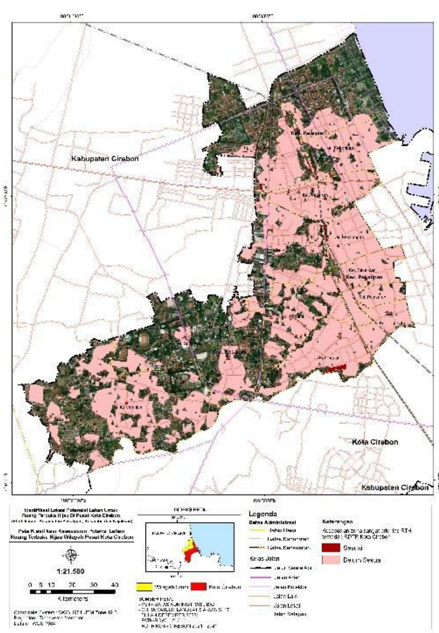


FIGURE 5. Classification of Potential Land for Green Open Space in Cirebon City Center Area

Directions for Potential Land Development of Green Open Space

The direction of potential land development for Green Open Space in the center of Cirebon City, comprising an area of 8.02 hectares or 1.16%, following the Detailed Spatial Plan of the City of Cirebon, holds significant potential for enhancement into Green Open Space. The appropriate land-use categories for this transformation encompass green lane areas (39.99%), cemetery spaces (5.57%), sub-district parks (2.93%), village parks (6.44%), city parks (12.35%), and neighborhood (RW) parks (32.77%). The improvement of Green Open Space quality can be achieved through various methods, spanning aspects of design, management, and community participation.

As for the land areas covering 681.42 hectares that need to align with the RDTR of Cirebon City, these should be given top priority for reforestation in the vicinity of developed zones. These categories encompass road infrastructure (9.88%), cultural heritage sites (0.11%), commercial and service areas (21.82%), offices (2.71%), defense-related facilities (0.07%), residential areas (59.41%), public service facilities (5.62%), and transportation infrastructure (0.37%). The greening initiatives will involve the modification of Green Open Space, adopting the concept of green infrastructure (GI).

The GI concept involves the implementation of various strategies to mitigate rising surface temperatures, such as green walls, green roofs, tree canopies, and bioswales. The green wall concept theoretically functions for evaporative cooling, provides shading, facilitates heat transfer, and minimizes wind effects. Research indicates that green walls integrated into building facades can maintain a lower temperature of 32.17°C, which is significantly cooler than areas without green walls, registering an average increase of only 1°C per hour despite external temperature fluctuations [15].

Furthermore, green roofs, particularly the Extensive Green Roof type, are well-suited for use in hot urban environments exposed to varying levels of rain. These green roofs contribute to temperature reduction and sustainable urban development [16]. The tree canopy concept leverages specific tree varieties with broad and expansive branching structures to form natural canopies. Such trees, including trembesi, banyan, and ketapang, maximize their capacity to lower ambient temperatures, apart from offering other ecological benefits [17]. Finally, the implementation of bioswales transforms peripheral areas and sidewalks into green lanes. Beyond the visual enhancement, bioswales serve as efficient runoff waterways during rainfall, while the planting of suitable vegetation also enhances oxygen production in the urban environment. [18].

CONCLUSION

Research on the potential of open space land in the center of Cirebon, encompassing Pekalipan, Kesambi, and Kejaksan Districts, reveals that land classes with very high priority dominate, constituting 48% of the total, covering an area of 698.87 hectares. Notably, Kesambi District exhibits the highest proportion in comparison to Pekalipan and Kejaksan Districts, at 25.69%. The emphasis for potential green open space land development in the heart of Cirebon City is directed towards these high-priority zones, adjusted to conform with the Detailed Spatial Plan of the City of Cirebon.

Specifically, an area of 8.02 hectares, or 1.16% of land following the RDTR of Cirebon City, presents an opportunity for quality improvement as Green Open Space. This improvement can be realized through the application of diverse methods, encompassing aspects of design, management, and community participation. In contrast, a land class spanning 681.42 hectares, which does not align with the RDTR of Cirebon City, is designated as a top priority for reforestation within the developed areas. This rejuvenation includes the modification of green open space through the application of green infrastructure concepts such as green walls, green roofs, tree canopies, and bioswales.In this study, radiometric correction or reflectance correction was not conducted for bands 4 and 5, as researchers focused on understanding the conversion of Digital Number (DN) to float type. The primary objective of the study is to determine Green Open Space location and area priorities, as well as to provide guidelines for suitable Green Infrastructure (GI) concepts aimed at mitigating the Urban Heat Island (UHI) effect based on compatibility with the RDTR of Cirebon City. The analysis does not extend to spatial modeling or regression analysis to assess the reduction in surface temperature resulting from the incorporation of Green Open Space. Additionally, there is no specific direction provided regarding the type of vegetation or its contribution to addressing UHI effects and enhancing local area comfort following applicable regulations. Consequently, future research endeavors may include radiometric correction, reflectance correction for bands 4 and 5, and NDVI analysis. Moreover, green open space research could involve impact analysis by incorporating regression or spatial modeling techniques to determine vegetation types in accordance with site-specific conditions.

REFERENCES

[1] Presiden Republik Indonesia, *Undang-Undang Republik Indonesia Nomor 26 Tahun 2007 Tentang Penataan Ruang*. 2007.

[2] BPS Kota Cirebon, *Kota Cirebon Dalam Angka 2021*. BPS Kota Cirebon, 2021. [Online]. Available: https://cirebonkab.bps.go.id/publication/2018/08/16/a17445e317d62cea861db32c/kabupaten-cirebon-dalam-angka-2018.html.

[3] L. S. Handayani and B. Ramadhan, "RTH di Kota Cirebon Masih Minim," *RepJabar*, 2021. https://repjabar.republika.co.id/berita/r4wzxv330/rth-di-kota-cirebon-masih-minim

[4] D. Zhou, S. Zhao, L. Zhang, G. Sun, and Y. Liu, "The footprint of urban heat island effect in China," *Sci. Rep.*, vol. 5, pp. 2–12, doi: 10.1038/srep11160, 2015.

[5] S. Ahmed, "The Egyptian Journal of Remote Sensing and Space Sciences Assessment of urban heat islands and impact of climate change on socioeconomic over Suez Governorate using remote sensing and GIS techniques," *Egypt. J. Remote Sens. Sp. Sci.*, doi: 10.1016/j.ejrs.2017.08.001, 2017.

[6] I. Fardani and M. R. Yosliansyah, "Kajian Penentuan Prioritas Ruang Terbuka Hijau Berdasarkan Fenomena Urban Heat Island Di Kota Cirebon," *J. Sains Inf. Geogr.*, vol. 5, no. 2, p. 93, doi: 10.31314/jsig.v5i2.1708, 2022.

[7] N. Humaida, "Metode penentuan prioritas ruang terbuka hijau di kota banjarbaru kalimantan selatan nida humaida," p. 62, 2016.

[8] USGS, "Landsat 8 Data Users Handbook," *Nasa*, vol. 8, no. November, p. 114, 2019, [Online]. Available: https://landsat.usgs.gov/documents/Landsat8DataUsersHandbook.pdf

[9] I. Tahir, R. E. Paembonan, Z. A. Harahap, N. Akbar, and E. S. Wibowo, "Sebaran Kondisi Ekosistem Hutan Mangrove Di Kawasan Teluk Jailolo Kabupaten Halmahera Barat Provinsi Maluku Utara," *J. Enggano*, vol. 2, pp. 143–155, 2017.

[10] N. Arifah and C. Susetyo, "Penentuan Prioritas Ruang Terbuka Hijau berdasarkan Efek Urban Heat Island di Wilayah Surabaya Timur," *J. Tek. ITS*, vol. 7, no. 2, doi: 10.12962/j23373539.v7i2.32454, 2018

[11] S. Nieuwolt, *Tropical Climatology : An Introduction To The Climates Of The Low Latitudes*. London: John Wiley and Sons, 1977.

[12] R. Emmanuel, "Thermal comfort implications of urbanization in a warm-humid city: The Colombo Metropolitan Region (CMR), Sri Lanka," *Build. Environ.*, vol. 40, no. 12, pp. 1591–1601, 2005, doi: 10.1016/j.buildenv.2004.12.004.

[13] F. N. Edelweis, "Analisis Tingkat Kenyamanan Iklim dan Termal Berdasarkan Temperature Humidty Index (THI) di Candi Borobudur," Universitas Islam Indonesia, 2020.

[14] Badan Pusat Statistik, *Klasifikasi Desa, Perkotaan, dan Perdesaan di Indonesia 2020*. 2020.

[15] V. Haryanto, Y. Yusintha, and P. P. Noviandri, "Efektifitas Green Facade Terhadap Kenyamanan Suhu Koridor Kasus : Lantai Tiga Gedung Makarios Universitas Kristen Duta Wacana Pendahuluan Kajian Teori," *SMART (Seminar Archit. Res. Technol.*, vol. 4, no. URBAN + LAB: Konsep, Prinsip dan Strategi Rancang Ruang Hidup di Kawasan Perkotaan, pp. 193–201, doi: https://doi.org/10.21460/smart.v4i1, 2019.

[16] L. Diartini, U. F. Andi, and Y. Purnomo, "Perancangan Ruang Terbuka Publik Di Kecamatan Pontianak Utara Dengan Pendekatan Desain Universal," *JMARS J. Mosaik Arsit.*, vol. 10, no. 1, p. 75, doi: 10.26418/jmars.v10i1.51638, 2022.

[17] I. Saroh and Krisdianto, "Manfaat ekologis kanopi pohon terhadap iklim mikro di ruang terbuka hijau kawasan perkotaan," *J. Hutan dan Masy.*, vol. 12, no. 2, pp. 136–145, doi: 10.24259/jhm.v12i2.10040, 2020.

[18] N. P. Margamu and S. Herlambang, "Hunian Sosial Dengan Pendekatan Green Architecture," *J. Sains, Teknol. Urban, Perancangan, Arsit.*, vol. 3, no. 2, p. 1945, doi: 10.24912/stupa.v3i2.12403, 2022.