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COMFORT INDEX BASED ON MICROCLIMATE CONDITIONS AND VISITOR PERCEPTIONS IN BUKIT PELANGI, SANGATTA CITY

Indeks Kenyamanan Berdasarkan Kondisi Iklim Mikro dan Persepsi Pengunjung di Bukit Pelangi, Kota Sangatta

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ABSTRACT

Bukit Pelangi is one of the areas that has urban green open spaces in Sangatta City. Venus Park, which is located in the Bukit Pelangi area, has many functions, including absorbing carbon dioxide (CO_2), producing oxygen (O_2), lowering the environmental temperature, and providing a cool atmosphere, making it a choice place to relax.This study aims to determine the microclimate conditions and the level of comfort in three different land cover types (Venus Park, built-up areas, and open land) as well as to understand visitor perceptions of the comfort and available facilities in Venus Park, Sangatta City. Data collection was conducted using an environment meter for 30 days, measuring indicators such as light intensity, air temperature, air humidity, and visitor perceptions through questionnaires. The results showed that the average light intensity in Venus Park was 897.2 lux, in built-up areas 1,690.5 lux, and in open land 2,006.9 lux. The average air temperature in Venus Park was 28.1 °C, in built-up areas 29.3 °C, and in open land 29.9 °C. The average air humidity in Venus Park was 81.1%, in built-up areas 76.2%, and in open land 75.2%. The comfort index (Temperature Humidity Index) for Venus Park (27.3), built-up areas (27.9), and open land (28.4) are included in the comfortable category. Based on visitor perceptions, the level of comfort in Venus Park was categorized as good. The information about comfort index and visitor perception can be used as a reference in planning the development of green open spaces, such as city parks, urban forests, and other open areas.

Keywords: Bukit Pelangi Area; Comfort Index; Microclimate; Venus Park; Visitor Perception

ABSTRAK

Bukit Pelangi adalah salah satu kawasan yang memiliki ruang terbuka hijau kawasan perkotaan di Kota Sangatta. Taman Venus yang terletak di kawasan Bukit Pelangi mempunyai banyak fungsi diantaranya sebagai penyerap karbon dioksida (CO_2), menghasilkan oksigen (O_2), menurunkan suhu lingkungan, dan memberikan suasana sejuk, sehingga menjadi salah satu pilihan tempat untuk bersantai. Penelitian ini bertujuan untuk mengetahui kondisi iklim iklim mikro dan mengetahui tingkat kenyamanan pada tiga tutupan lahan berbeda (Taman Venus, area terbangun, dan lahan terbuka) serta mengetahui persepsi pengunjung terhadap kenyamanan dan fasilitas yang tersedia di Taman Venus, Kota Sangatta. Pengambilan data dilakukan menggunakan alat Environment meter selama 30 hari dengan indikator yang diukur yaitu intensitas cahaya, suhu udara, kelembaban udara, dan persepsi pengunjung berdasarkan kuisioner. Hasil menunjukkan intensitas cahaya rata-rata di Taman Venus sebesar 897,2 lux, area terbangun sebesar 1.690,5 lux, dan lahan terbuka sebesar 2.006,9 lux. Suhu udara rata-rata Taman Venus sebesar 28,1°C, area terbangun sebesar 29.3 °C, dan lahan terbuka sebesar 29,9 °C,. Kelembaban udara rata-rata di Taman Venus sebesar 81,1%, area terbangun sebesar 76,2% dan lahan terbuka sebesar 75,2%. Indeks kenyamanan (*Temperature Humidity Index*) di Taman Venus (27,3), area terbangun (27,9), dan lahan terbuka (28,4) termasuk kategori nyaman. Berdasarkan persepsi pengunjung mengenai tingkat kenyamanan di Taman Venus termasuk kategori baik. Informasi tentang indeks kenyamanan dan persepsi pengunjung dapat digunakan sebagai rujukan dalam perencanaan pembangunan ruang terbuka hijau, seperti taman kota, hutan kota, dan area ruang terbuka lainnya.

Kata kunci: Iklim Mikro; Indeks Kenyamanan; Kawasan Bukit Pelangi; Persepsi Pengunjung; Taman Venus

Submitted: 17 August 2025; Accepted: 19 October 2025

A. INTRODUCTION

The reduction of green open spaces in a city tends to lead to a decline in ecological environmental quality, resulting in microclimate changes marked by rising air temperatures, air pollution, and decreased humidity (Maarebia *et al*. 2017). Trees in green open spaces, like in urban forests, city parks, arboretums, road medians, sports fields, and public cemeteries, can improve the local climate. This is because the leaves and branches of plants can reduce the amount of sunlight and heat that reaches the ground, make the air more moist, decrease wind, and reduce noise. All of this makes the area more comfortable for people (Karyati *et al.* 2020; Karyati *et al.* 2021; Taufiq & Wulandari 2022; He & Reith 2023; Karyati *et al.* 2023; Sutapa *et al.* 2023; Baruti *et al.* 2024).

Local climate and thermal comfort, influenced by the presence of green open space in urban areas (Dissanayake & Weerasinghe 2021; Sutapa *et al.* 2023), have been shown to improve the well-being of urban residents. This improvement includes mental and physical health, happiness, satisfaction, and quality of life from a psychological and physiological perspective (Lai *et al.* 2020; Aram *et al.* 2022; Arrar *et al.* 2022; Bille *et al.* 2023; Dollah *et al.* 2023; Hunter *et al.* 2023). According to the Regulation of the Minister of Home Affairs No. 1 of 2007, Chapter 1 Article 1 Paragraph 2, an urban forest is an area within a city that is densely planted with trees, either on state or private land, and designated by the authorities. The majority of the visitors have a good perception of microclimate and comfort in green open spaces (Karyati *et al.* 2025).

Kutai Timur Regency is one of the regencies in East Kalimantan Province, Indonesia. Its capital city is Sangatta, covering an area of 35,747.50 km², or about 17% of the total area of East Kalimantan Province, with a population of 424,334 and a density of 12 people per km² (BPS Kutim 2020). Bukit Pelangi is the government office complex of Kutai Timur Regency and also serves as a tourist destination in Sangatta City. Located about 10 kilometers from the city center, this area spans more than 60 hectares and sits at an elevation of approximately 78 meters above sea level (Wahyu & Kuswaji 2019). Facilities in the Bukit Pelangi area include a sports track over one kilometer in length, a children's playground, gazebos, and zones for Micro, Small, and Medium Enterprises (MSMEs). Additionally, the Al-Faruq Grand Mosque enhances the completeness of the facilities in the area.

One of the tourist attractions in the Bukit Pelangi area is Venus Park. This park plays an important role as a carbon dioxide (CO_2) absorber and an oxygen (O_2) producer, as well as in lowering temperatures to create a cooler atmosphere. Trees have many benefits, including improving the microclimate. In addition to the park, the Bukit Pelangi area also includes open land areas, such as a field without any vegetation, and built-up areas consisting of government buildings located within the region. The purpose of this study was to analyze microclimate conditions and comfort levels in different land cover types (Venus Park, built-up areas, and open land) and to determine visitors' perceptions of comfort in relation to the microclimate and various facilities available in Venus Park, Sangatta City. Information about microclimate comfort, based on the THI index and the perceptions of city park visitors, can be taken into consideration in the planning and management of urban green open spaces that are more comfortable, sustainable, and suitable for tropical climates.

B. METHODS

This research was conducted in the Bukit Pelangi area of Sangatta City, located within the office complex area on Bukit Pelangi Street, Teluk Lingga, North Sangatta District, East Kutai Regency, East Kalimantan Province. The study was carried out for approximately 7 months, from September 2024 to March 2025.

Materials and Tools

The tools and materials used in this research included an environment meter (for measuring light intensity, air temperature, and humidity), a camera (mobile phone), a laptop, writing tools and tally sheets, a calculator, the Timestamp application, the Canopeo application, and questionnaires for visitors participating at the research site.

Procedures

1. Determination of Location and Research Point

The determination of the research location aimed to directly identify and observe field conditions as well as to select appropriate sites for conducting the study. The points for microclimate data collection and the distribution of visitor comfort questionnaires were carried out in three different land cover types in the Bukit Pelangi Area of Sangatta City, namely. Venus Park at coordinates 0°52'29.7"S and 117°60'92.5"E, Built-up Area at coordinates 0°52'18.5"S and 117°60'91.4"E, Open Land at coordinates 0°52'40.8"S and 117°60'93.4"E. The research location map is shown in Figure 1. While, Figure 2 shows the locations of microclimate data collection and the distribution of visitor comfort questionnaires, which were conducted across three different land cover types in the Bukit Pelangi Area of Sangatta City.

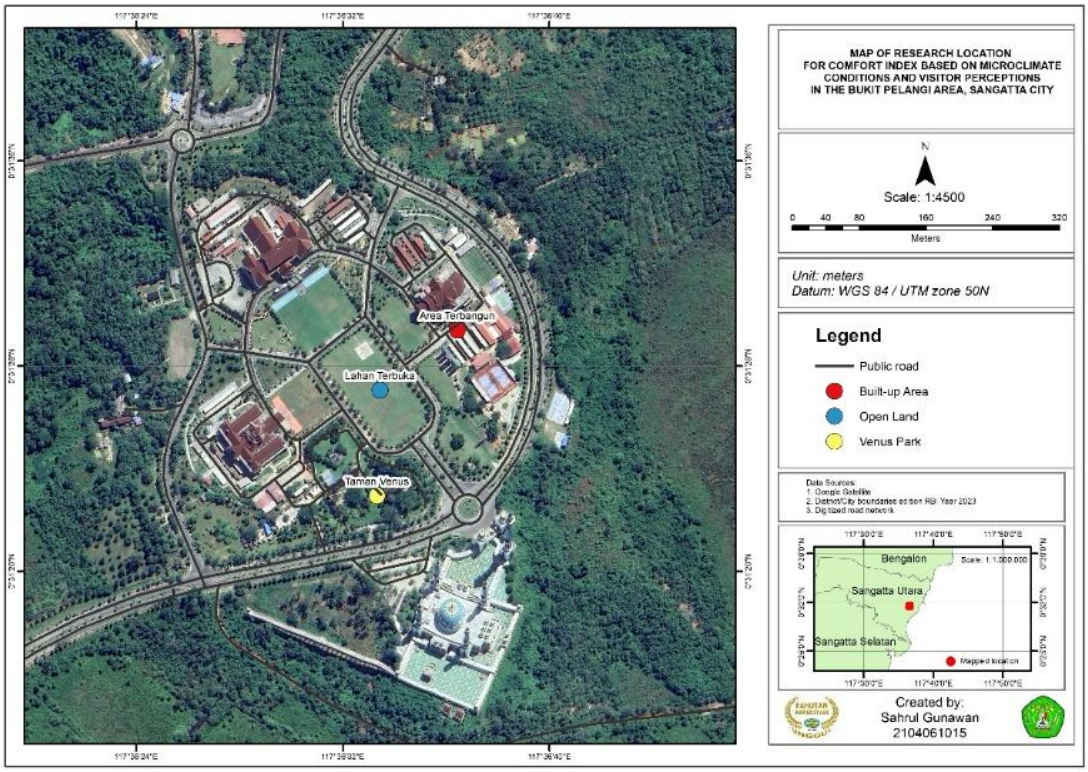

Figure 1. Map of the research location

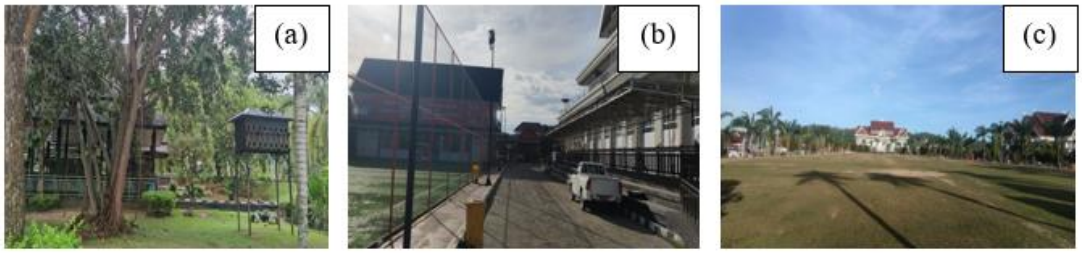

Figure 2. Data collection locations (a) Venus Park, (b) Built-up area, and (c) Open land.

2. Data Collection

Data collection in the field consisted of:

a. Canopy cover percentage data collection.The measurement of canopy cover percentage was carried out at the microclimate data collection site, which included light intensity, air temperature, and humidity in Venus Park. The canopy cover data were collected using the Canopeo application. The measurement was performed by pointing a mobile phone camera, with the Canopeo app installed, upward or directly beneath the tree canopy, then capturing an image and selecting the save menu. The canopy cover percentage value was automatically generated by the application. Subsequently, vegetation data in Venus Park were collected. The data included diameter, height, and species name. These data were used to identify the types of plants found in Venus Park.

b. Microclimate data and visitor perception collection. Microclimate measurements (light intensity, air temperature, and air humidity) were taken three times a day (morning from 7:00 AM to 8:00 AM, afternoon from 12:00 PM to 1:00 PM, and evening from 5:00 PM to 6:00 PM) for 30 days in Venus Park, built-up areas, and open land. Measurements were taken three times a day to obtain daily variations in climate conditions due to changes in light intensity. Morning measurements reflect the start of warming, noon shows the hottest conditions, and evening describes the cooling process, thus providing a comprehensive description of daily microclimate fluctuations. This study used accidental sampling, where the researcher selected 30 respondents who visited the city park and were willing to fill out the questionnaire.

c. Primary data. The primary data obtained included measurements of light intensity, air temperature, humidity, and canopy cover percentage at the research locations using the Canopeo application installed on a mobile phone. The comfort index was calculated based on microclimate conditions, while the comfort level was assessed based on

visitor perceptions collected through questionnaires. The data collected also included the age of visitors, with the criterion being ≥17 years old, involving a total of 30 respondents.

d. Secondary data. Secondary data are supporting data in this research, obtained from various literature sources such as books, theses, and scientific journals. The secondary data used in this study include information about the conditions at the research location (city parks, sports facilities, office buildings, and others), geographical location, and administrative boundaries of the research area.

Data Analysis

1. Microclimate Condition

The daily light intensity, air temperature (Sabarudin 2012), and air humidity were calculated using the following formulas:

$$LI_{daily} = \frac{LImorning + LInoon + Llafternoon}{3}$$

where, IC_{daily} is daily light intensity (lux), $IC_{morning}$ is light intensity in the morning measurement (lux), IC_{noon} is light intensity at noon measurement (lux), $IC_{afternoon}$ is light intensity in the afternoon measurement (lux).

$$T_{daily} = \frac{2Tmorning + Tnoon + Tafternoon}{4}$$

where, T_{daily} is daily air temperature (°C), $T_{morning}$ is air temperature in the morning measurement (°C), T_{noon} is air temperature at noon measurement (°C), $T_{afternoon}$ is air temperature in the afternoon measurement (°C).

$$RH_{daily} = \frac{2RHmorning + RHnoon + RHafternoon}{4}$$

where, RH_{daily} is daily air humidity (%), $RH_{morning}$ is air humidity in the morning measurement (%), RH_{noon} is air humidity at noon measurement (%), $RH_{afternoon}$ is air humidity in the afternoon measurement (%).

Comfort level or Temperature Humidity Index (THI) was measured by equation (McGregor and Nieuwolt, 1998):

$$THI = 0.8T + (RH \times T)/500$$

where, THI is Temperature Humidity Index, RH is relative humidity (%), T is air temperature (°C).

The Temperature Humidity Index (THI) serves as a quantitative comfort index, reflecting the level of thermal comfort in a given area. The established criteria for interpreting this comfort index are provided in Table 1.

Table 1. Comfort level criteria

Comfort Index (THI)	Description
< 29.0	Comfortable
29.0 – 30.5	Uncomfortable
> 30.5	Very Uncomfortable

Source: Frick and Suskiyanto (1998)

2. Visitor Perception

Data collection regarding visitor comfort and available facilities at Venus park was conducted by distributing questionnaires, specifically by interviewing visitors. The criteria for data analysis and scoring of alternative answers on the Likert Scale are as follows: Strongly Agree (SA) = 5, Agree (A) = 4, Neutral (N) = 3 (or Indifferent / Undecided), Disagree (D) = 2, Strongly Disagree (SD) = 1.

The scoring technique used in this research employs a maximum score of 5 and a minimum score of 1. Therefore, the calculation of the respondent's answer index uses the following formula:

$$\text{Average Score} = \frac{(Pn1 \times T1) + (Pn2 \times T2) + (Pn3 \times T3) + (Pn4 \times T4) + (Pn5 \times T5)}{\text{Total Number of Respondents}}$$

where, T is total number of respondents who chose (a particular option), Pn is the numerical value of the Likert Scale option.

This research employs descriptive statistics, where answers in the questionnaire are weighted and evaluated based on class intervals. The Likert Scale categories are presented in Table 2.

Table 2. Likert scale categories

Scale	Category
1.00 – 1.80	Very Bad
1.81 – 2.60	Not Good
2.61 – 3.40	Less Good
3.41 – 4.20	Good
4.21 – 5.00	Very Good

Source: Sugiyono (2013)

C. RESULTS AND DISCUSSION

Climatic Conditions

Kutai Timur Regency features a tropical rainforest climate, with an average air temperature of 26 °C. The diurnal temperature range in Kutai Timur is approximately 5-7 °C. Rainfall within Kutai Timur varies significantly, increasing from coastal areas towards the increasingly humid inland regions. The average annual rainfall for Kutai Timur Regency ranges between 2,000-4,000 mm, with an average of 130–150 rainy days per year. The average air temperature in Kutai Timur is around 26 °C, with a daily variation between 5-7 °C.

Based on the Schmidt Ferguson Climate Classification System (1951), Kutai Timur's climate is categorized as Type A, indicating a very wet region characterized by tropical rainforest vegetation (Bappeda Kabupaten Kutai Timur 2016). According to rainfall and rainy days data from the Kutai Timur Regency Central Statistics Agency for 2023, Sangatta Utara experienced its highest rainfall in December, approximately 230.0 mm, and its lowest in February, around 95.0 mm. The number of rainy days in Sangatta Utara in 2023 peaked in January with 20 days, and was lowest in February with 10 days. Rainfall data for Sangatta Utara District is presented in Table 3.

Table 3. Total Rainfall and Number of Rainy Days by Month in Sangatta Utara District, 2023

Month	Rainfall Amount (mm)	Number of Rainy Days (days)
January	120.0	20
February	95.0	10
March	103.0	12
April	96.0	11
May	142.0	13
June	159.5	11
July	128.0	11
August	135.5	14
September	122.5	14
October	121.5	14
November	197.0	12
December	230.0	15
Average	**137.5**	**13.08**

Source: Central Statistics Agency of Kutai Timur Regency (2023)

Canopy Cover Percentage

Canopy cover percentage encompasses the parts of leaves, stems, twigs, branches, and fruits found on a tree. The percentage of canopy cover on a tree significantly influences the microclimate conditions in an area, as tree canopies have the ability to protect against light intensity reaching the ground (Cahyaningrastiwi *et al.* 2021). The measurement points for canopy cover percentage in Venus Park were located beneath the stands of *Ficus elastica* Roxb. ex Hornem (red rubber). This specific species was chosen due to its wider and denser canopy compared to other types, resulting in *F. elastica* (red rubber) dominating the Taman Venus area. The measurement of tree canopy cover percentage was performed using the Canopeo application, with the results presented in Table 4.

The canopy cover percentage measurements conducted beneath the *F. elastica* (red rubber) stands, measured from the north, east, west, and south directions, yielded an average canopy cover percentage of 40.17%. This indicates that the canopy cover percentage of *F. elastica* (red rubber) trees is considered moderate. The measurement of canopy cover percentage is presented in Figure 3.

Table 4. Percentage of sample tree canopy (red rubber)

Direction of Canopy Projection Measurement	Canopy Cover Percentage (%)
North	42.69
East	42.61
West	37.59
South	37.76
Average	**40.17**

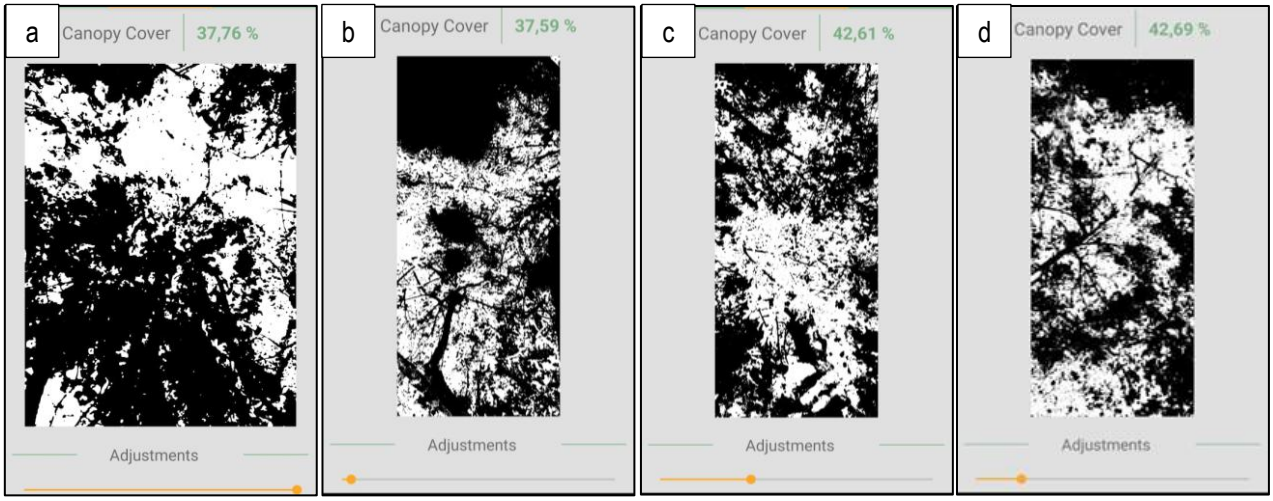

Figure 3. Canopy percentage of red rubber. (a) Canopy cover percentage (south direction), (b) Canopy cover percentage (west direction), (c) Canopy cover percentage (east direction), and (d) Canopy cover percentage (north direction).

Light Intensity

Measurements of light intensity were conducted at three different times: in the morning (07:00-08:00 am), at noon (12:00-01:00 pm), and in the afternoon (05:00-06 pm). The results of the average daily light intensity measurements from three different locations, namely Venus Park, built-up area, and open land, are presented in Table 5.

Table 5. Average light intensity at three measurement times in three different locations within the Bukit Pelangi Area, Sangatta City

Measurement Locations	Light Intensity (Lux)		
	Morning	Noon	Afternoon
Venus Park	785.3	1,081.7	824.6
Built-up Area	1,374.9	2,323.6	1,372.9
Open Land	1,660.7	2,699.3	1,660.6

Based on the average light intensity measurements over 30 days at all three locations, the highest average intensity was recorded during the noon measurement, reaching 2,699.3 lux, which was found in the open land location. Conversely, the lowest average light intensity recorded was 785.3 lux, obtained from the morning measurement at Venus Park. Etwiory *et al*. (2022) explained that solar radiation in open land directly penetrates the ground surface without obstruction, whereas in vegetated areas, solar radiation is transmitted, refracted, and reflected by the tree canopy, resulting in lower light intensity values beneath the canopy compared to open land.

Light intensity at three different locations, namely Venus Park, built-up area, and open land, is presented in Figure 4. The open land exhibited higher light intensity values compared to Taman Venus and the built-up area. Based on the graph of light intensity over 30 days at these three different locations, as shown in Figure 5, there is a clear difference in the average light intensity values over the 30-day period.

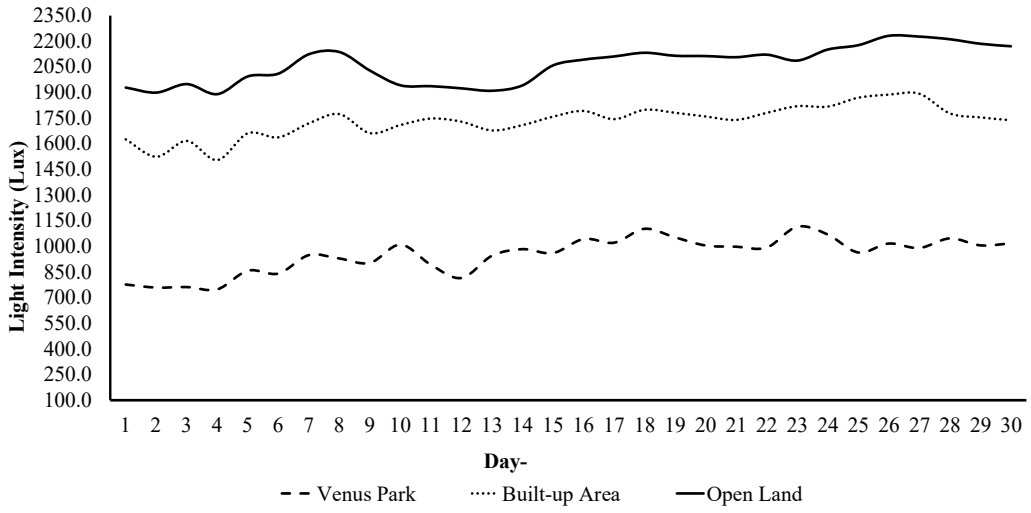

Figure 4. Average light intensity across three distinct locations within the Bukit Pelangi Area, Sangatta

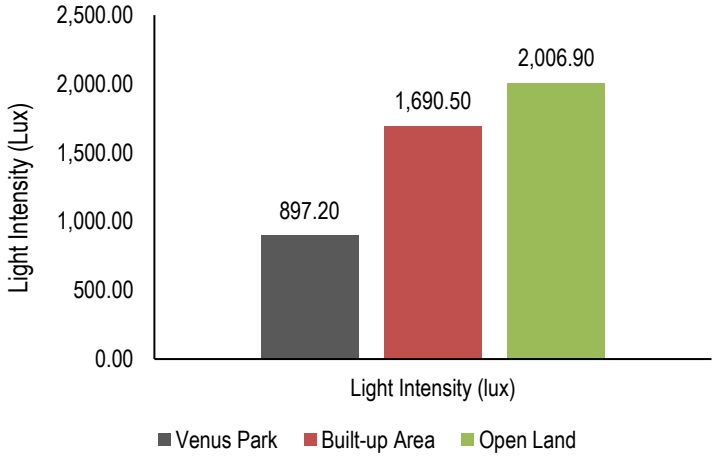

Figure 5. Mean light intensity over a 30-day period across three distinct locations within the Bukit Pelangi Area, Sangatta City

The first location, Venus Park, had an average light intensity value of 897.2 lux. Subsequently, at the built-up area, the light intensity increased to 1,690.5 lux. In the last location, the open land, there was a further increase, with its average light intensity reaching 2,006.9 lux, which was higher than both Venus Park and the built-up area. The light intensity in Venus Park, ranging from 500 to 1,000 lux, provides a comfortable environment for visitors to engage in light outdoor activities such as walking, sitting, or relaxing in the park, as the lighting is sufficient without causing excessive glare. In contrast, the light intensity in built-up areas and open land, ranging from 1,000 to 2,000 lux, is still acceptable but tends to feel hotter or more glaring, especially in the absence of shade or reflection from bright surfaces. Meanwhile, during midday on open land with light intensity exceeding 2,000 lux, visual and thermal discomfort often occurs due to the lack of vegetation or protective cover.

Air Temperature

Measurements of air temperature were conducted at three different times: in the morning (07:00-08:00 WITA), at noon (12:00-13:00 WITA), and in the afternoon (17:00-18:00 WITA). The results of the average daily air temperature measurements from three different locations, namely Venus Park, built-up area, and open land, are presented in Table 6.

The average air temperature measurements taken over 30 days at the three different locations showed varying temperatures. Venus Park consistently exhibited lower air temperatures during morning, noon, and afternoon measurements compared to both the built-up area and open land. Based on the 30-day average air temperature results from all three locations, the highest average value recorded was 33.4 °C, observed during the noon measurement in the open land location. Conversely, the lowest average air temperature recorded was 26.8°C, obtained from the morning measurement at Venus Park. The comparison of average daily air temperature data collected over 30 days at three different locations, namely Venus Park, built-up area, and open land, is presented in Figure 6.

Table 6. Average air temperature at three measurement times in three different locations within the Bukit Pelangi Area, Sangatta City

Measurement Locations	Air Temperature (°C)		
	Morning	Noon	Afternoon
Venus Park	26.8	29.9	29.0
Built-up Area	27.6	32.3	29.8
Open Land	27.8	33.4	30.5

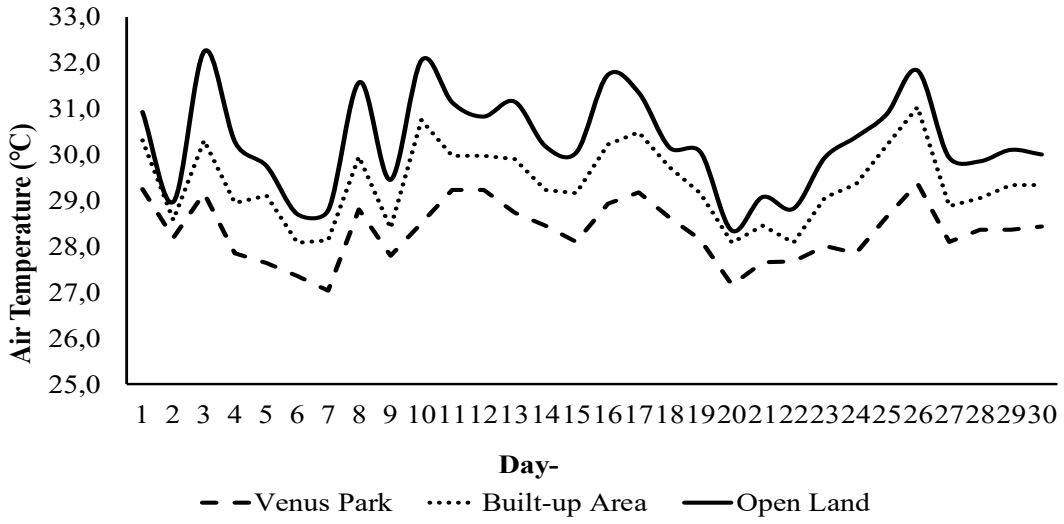

Figure 6. Average air temperature at three different locations within the Bukit Pelangi Area, Sangatta City

Venus Park location had an average temperature of 28.1 °C. Subsequently, the second location, the built-up area, recorded an air temperature of 29.3 °C, and the open land had an average air temperature of 29.9 °C. Although the average temperature at the three research sites falls within a rather warm range of 28–32 °C, it remains tolerable, especially since visitors usually engage in light to moderate outdoor activities in the morning and afternoon. Bukit Pelangi area is covered with many trees and is situated at an elevation of 78 meters above sea level, allowing gentle breezes to create a comfortable environment for visitors to enjoy leisurely outdoor activities. The comparison of average air temperatures over 30 days at three different locations is presented in Figure 7.

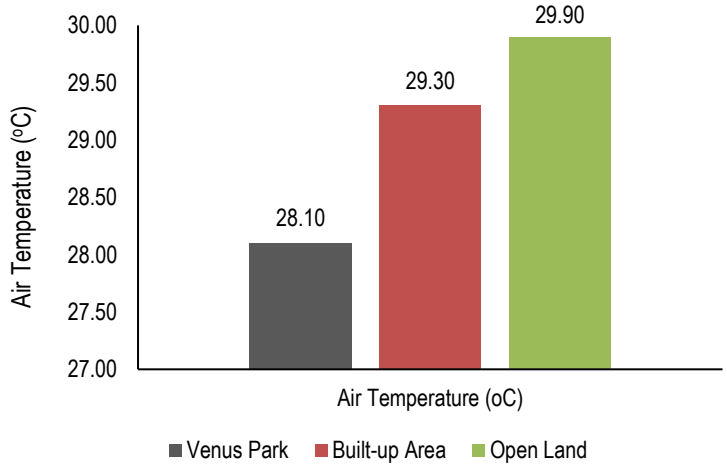

Figure 7. Average air temperature over 30 days at three different locations within the Bukit Pelangi Area, Sangatta City

Air Humidity

The average daily air humidity measurements from three different locations Venus Park, built-up area, and open land are presented in Table 7. The quantity of water content in the air depends on numerous factors, primarily water availability, vapor sources, air, wind, and water pressure. The comparison of average daily air humidity data collected over 30 days at three different locations Venus park, the built-up area, and open land is presented in Figure 8.

Table 7. Average air humidity at three measurement times in three different locations within the Bukit Pelangi Area, Sangatta City

Measurement Locations	Air Humidity (%)		
	Morning	Noon	Afternoon
Venus Park	87.2	73.2	76.6
Built-up Area	81.9	66.5	74.5
Open Land	79.5	67.2	74.5

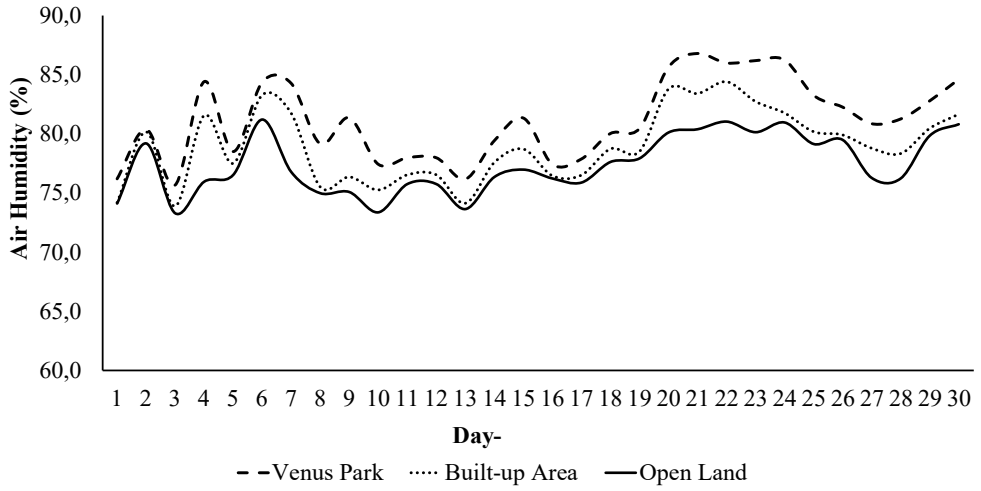

Figure 8. Average air humidity at three different locations within the Bukit Pelangi Area, Sangatta City

Figure 9 presents the comparison of average daily air humidity values across the three distinct locations. Venus Park recorded the highest humidity value at 81.3%. Air humidity in the built-up area decreased to 76.2%, and the open land exhibited a humidity value of 75.2%. The air humidity at the research site, which exceeds 75%, could be considered too humid. This condition has been known to make the air feel stuffy and reduce the efficiency of the body's cooling process through sweating, leading to a sense of heat and discomfort during outdoor activities. However, the presence of a significant amount of trees and vegetation in the Bukit Pelangi area has the potential to positively impact the microclimate by reducing sunlight exposure and air temperature, which may contribute to a more comfortable environment for outdoor activities.

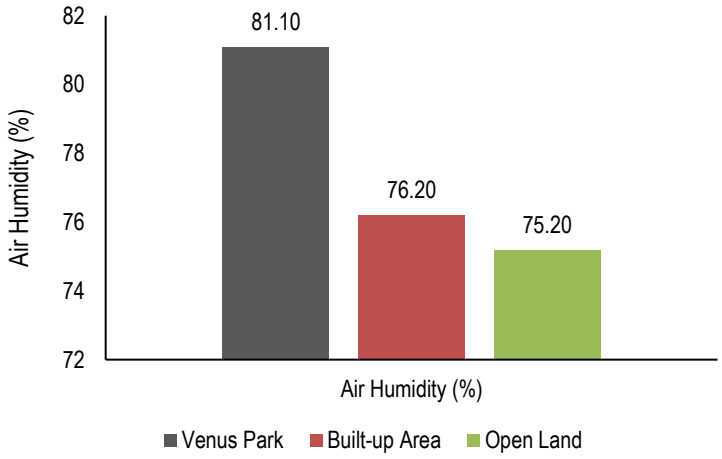

Figure 9. Average air humidity over 30 days at three different locations within the Bukit Pelangi Area, Sangatta City

Temperature Humidity Index

Based on the average Temperature Humidity Index (THI) measurements from the three different locations, Venus Park recorded a value of 27.3, falling into the comfortable category. The built-up area had a THI of 27.9, also within the comfortable category, and the open land showed a THI of 28.4, which is likewise classified as comfortable. The results of these comfort index measurements are presented in Figure 10.

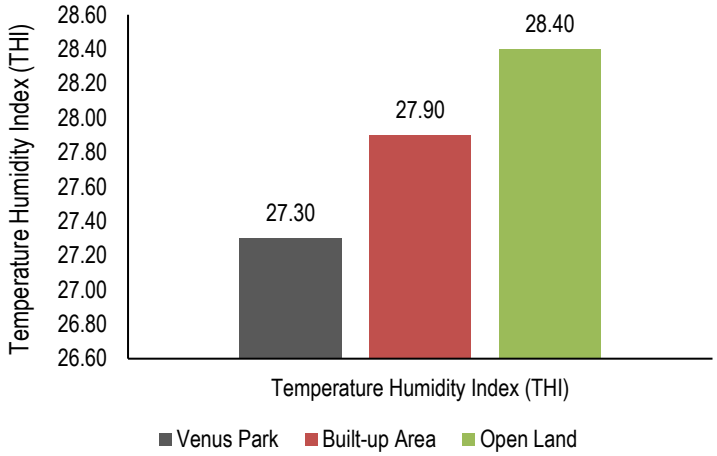

Figure 10. THI (Temperature Humidity Index) at three different locations

Visitor Perception

Responses were collected from 30 visitors to Venus Park in Sangatta City, representing the overall visitor population. The respondents comprised 21 individuals aged 17-25 years (70.0%), 4 individuals aged 26-29 years (13.3%), and 5 individuals over 40 years old (16.7%). The age group of 17-25 years constituted the majority of visitors to Venus Park. The recapitulation of the average scores for studied indicators is presented in Table 8.

Table 8. Recapitulation of average scores for each indicator

No.	Indicator	Average Score	Category
1	Microclimate	4.27	Very Good
2	Facilities	3.96	Good
3	Aesthetics	4.09	Good
4	Accessibility	4.38	Very Good
5	Safety	4.23	Very Good
6	Cleanliness	4.13	Good
7	Noise	3.80	Good
	Average	**4.12**	**Good**

The average score across all indicators was 4.12, falling into the good category. Visitors' perceptions of the microclimate in Venus Park as very good are consistent with the thermal comfort index (THI), which falls into the comfortable category. Microclimate comfort based on THI and visitor perceptions is mainly influenced by the dynamics of light intensity, air temperature, and air humidity at the research site. In addition to microclimate indicators, accessibility and safety indicators (very good), as well as facility, aesthetics, cleanliness, and noise indicators (good), greatly influence visitor perceptions of comfort in Venus Park. The future urban park planning in tropical regions should consider microclimate factors, such as temperature, humidity, light, and wind, to enhance visitor comfort. Dense vegetation and shaded areas are essential for reducing heat and improving air circulation. The study highlights the need to develop sustainable and thermally comfortable urban parks that enhance public well-being in tropical settings.

D. CONCLUSION

1. Light intensity was highest (2,006.9 lux) in open land, followed in built-up area (1,690.5 lux) and Venus Park (897.2 lux). Air temperatures were 29.9^{o}C in open land, 29.3^{o}C in built-up areas, and 28.1^{o}C in Venus Park. Meanwhile air humidity in Venus Park, built-up area, and open area were 81.1%, 76.2%, and 75.2%, respectively.
2. The comfort index (Temperature Humidity Index) for all three research locations included the comfortable category. Venus park had a THI of 27.3, the built-up area was 27.9, and open land was 28.4.
3. According to visitor perceptions, based on indicators such as microclimate, accessibility, and safety included to be a very good category, while indicators of facilities, aesthetics, cleanliness, and noise indicated that Venus Park categorized into the good.

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