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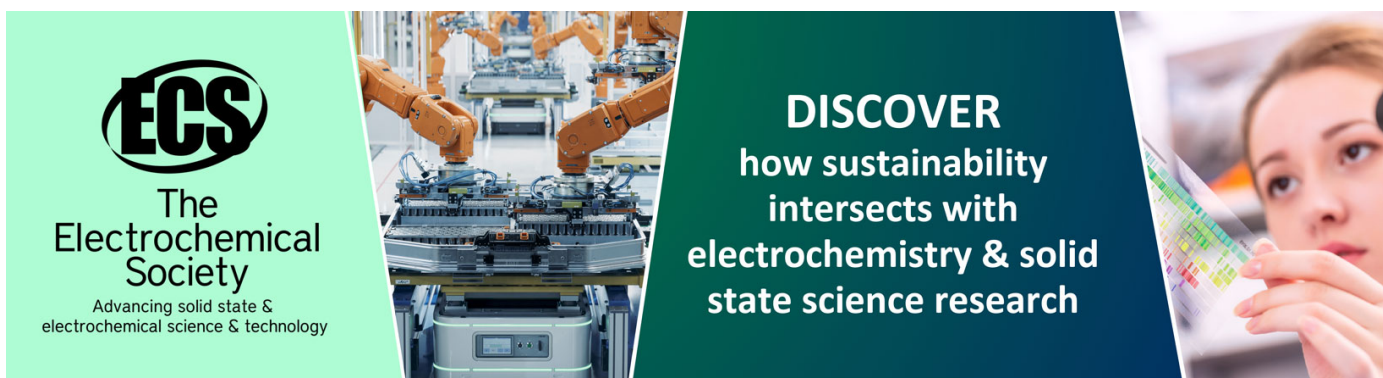
The benefit of urban green area in Kota Kinabalu, Sabah

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The benefit of urban green area in Kota Kinabalu, Sabah

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Abstract. The city of Kota Kinabalu features several urban green areas, which become the focal points for the urban inhabitants. This study was conducted to determine the benefits and public perceptions that encourage them to visit the local urban green area. The convenience sampling method was used, in which questionnaires were distributed to 101 respondents of the local park visitors. The present finding revealed that most of the respondents strongly agreed that the urban greens help to improve the physical well-being of the urban dwellers (Mean score, $\mu=4.27$), regulate the urban temperature during sunny days ($\mu=4.20$), encourage people to spend more time on outdoor activities in nature ($\mu=4.14$), help to remove air pollutants ($\mu=4.09$), control the amount of water on the ground surface during the rainy season ($\mu=4.06$), reduce stress, anxiety, and depression ($\mu=4.04$), prevent the occurrence of a flash flood ($\mu=3.98$), and promote social interactions among people ($\mu=3.81$). The correlation between the respondents' education and the mean benefits of urban green areas in Kota Kinabalu was significant ($p<0.05$). In conclusion, the public perception of the benefits of urban green areas is generally positive, and they also exhibit a high understanding of its importance towards urban dwellers.

Keywords: Urban green areas; urban park; Kota Kinabalu; public perception.

1. Introduction

Trees have been recognized universally to be a crucial component of urban landscapes for ages because they provide many benefits to society [1]. One of the constant elements included in the urban forest is urban greens, where plenty of it has been established around the country. Urban Greens such as the public parks, gardens, streets line, streams, and forest stands provide an important recreation resource that contributes to the wellbeing of people particularly the city dwellers. They mostly provide an area for exercise, social interaction, and reflection [2]. In Malaysia, the sight of people doing their activities such as exercising, picnicking, or taking a stroll with their family and friends in public parks is a familiar sight, particularly in the evening and weekends. This area is also where the presence of urban trees is abundant. It is safe to say that cities have always been associated with hectic life, noisy, and crowded given the high population and a lot of vehicles inside [3,4]. Therefore, the presence of trees in the city will provide benefits to the city dwellers. There is much research that has been made stating that trees can influence the physical and mental state of individuals. The existence of green space in the city will provide calmness and fresh air for the dwellers. In addition, trees in the urban forest also provide health and environmental benefits which range from protecting and maintaining biodiversity to helping in the mitigation or adaptation of climate change [5,6,7].

Over the years, the government has established many public parks and green areas for the benefit of city dwellers [8,9]. However, the existing values of the functions of the given urban green areas remain uncertain at this moment. There are still some people that have a low understanding of the benefits of urban trees. In regard, negatively thinking the urban forest area to be more beneficial if it is converted to industrial buildings. Oftentimes, their wrong perception of the urban trees leads to problems such as vandalism. Sometimes, the maintenance of urban trees is also neglected. If this problem is not fixed properly, the presence of urban forests in the city will be threatened. Henceforth, this study was



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conducted as a preliminary study to find out people's perceptions on the benefits and importance of urban trees to the city inhabitants in Kota Kinabalu, Sabah.

2. Methods

2.1 Study site

Kota Kinabalu, the capital of Sabah in East Malaysia, covers approximately an area of 352.2 km². The city is locally known as 'KK,' and is Malaysia's seventh-largest city, with an urban inhabitant of over 560,000 population made up of a varied range of ethnic groups, including coastal native tribes [10]. The study was conducted at the well-known urban green parks located in the city of Kota Kinabalu, namely, the Prince Philip Park, Teluk Likas Public Park, Petagas Memorial Park, Tun Fuad Stephen Park, Ujana Rimba Public Park, Kampung Air Pocket Park, Lintasan Deasoka Pocket Park and Signal Hill Park [8]. In addition, Kota Kinabalu is surrounded by lovely beaches, tropical islands, and picturesque landscapes. The city has the potential urban ecotourism destination because of its unique natural beauty, which is currently the main tourist attraction and meets tourist expectations [11]. Figure 1 displays the study flow chart and the location of Kota Kinabalu City.

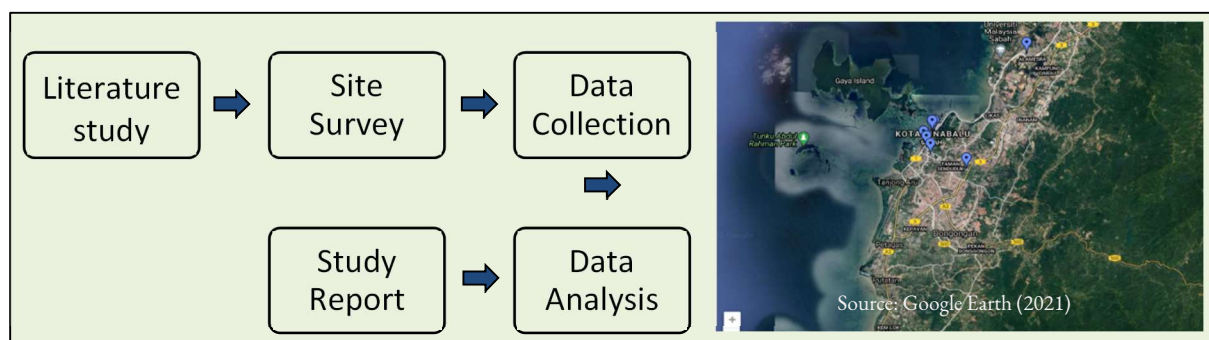


Figure 1. Study flow chart and the location of Kota Kinabalu city in map.

2.2 Research procedure and data collection

Initially, the study begins with the process of literature study and selecting the study area. This is important in obtaining baseline data of the area in more detail. Next, the data collection via convenience sampling method was conducted in all the urban parks by distributing questionnaires to the public using google survey link started from December 2019 to February 2020 (3 months), in this study. The convenience sampling is a type of non-probability sampling method where the sample is taken from a group of people that easy to contact or to reach. The questionnaires consisted of 12 questions and divided into 2 sections: which are demographic information and public perception on the benefit of urban trees in Kota Kinabalu.

2.3 Data analysis

The data obtained were analyzed using the statistical software IBM SPSS Statistics ver.20 at a 95.0% confidence interval to obtain the basic statistics, weighted average, and correlation. Descriptive analyses such as frequency, min, max, and percentage were used to obtain information on the socio-demographics. The correlation between the demographic information and mean respondents' perception was analyzed to measure the strength of variable and relationship by using bivariate correlations test. While for the reliability analysis for the perception section, Cronbach's alpha was used to measure internal consistency (reliability) in the multiple Likert questionnaires [12,13]. Whereas, the scale given ranges from 1 to 5. Scale 1 means respondents 'strongly disagree' with the statement, scale 2 respondents 'disagree', scale 3 respondents are 'neutral' with the statement, scale 4 respondents 'agree', and scale 5 means respondents 'strongly agree' with the statement.

3. Results

The validity and reliability tests were conducted using the sample of questionnaire study and obtained the test score of Cronbach's Alpha (α) with the value of 0.944 which corresponds to the validity and reliability of the instrument. However, the Kolmogorov-Smirnov (K-S) normality test shows a significance level at a value of 0.05. This indicates that the population sampled in this study is not normally distributed, so in that case, the non-parametric analysis will be initiated in this study.

3.1 Demography analysis

Regarding the demographic result of respondents, the result was tabulated, as shown in below Table 1. The majority of respondents are from Sabah with a total of 72 respondents (71.3%). Whereas, the number of male respondents who answered this questionnaire is more than female. A total of 76 respondents (75.2%) were male and a total of 25 respondents (24.8%) were female. Most of the respondents are between the age of 21-30 years old, which is a total of 74 respondents (73.3%) out of 101 respondents. It shows that the highest respondents' races are Bumiputera Sabah, which is a total of 57 respondents (56.4%) and followed by Bumiputera Sarawak, which is a total of 22 respondents (21.8%). The highest respondent's religion is Christian, with 62 respondents (61.4%) and followed by Muslim, 33 respondents (32.7%) out of 101 respondents. In terms of education level, 60 respondents (59.4%) have degrees, 15 respondents (14.9%) have college or technical skills, 12 respondents (11.9%) have a diploma, 8 respondents (7.9%) are still in secondary school, while 2 respondents (2.0%) have no formal education. It indicates that the highest respondents are students, with 72 respondents (71.3%) out of 101 respondents. For the household income, it shows that 58 respondents (57.4%) have RM1000-RM3000 income per month. Besides, 39 respondents (38.6%) have RM3000-RM5000 income per month and 2 more respondents (2.0%) have more than RM5000 income per month. Lastly, the park distance from the respondent residence indicates that 40.13% are between 5 to 15 km followed by 38.82% that less than 5 km distance (refer to Table 1.).

3.2 The benefits of urban green in Kota Kinabalu.

From the weighted mean score, there are 8 statements that respondents' percept regarding the benefits of urban trees in Kota Kinabalu. All of these statements have a scale-shaped answer space. Respondents will select only one scale related to each statement given based on their perspective views. The scale given ranges from 1 to 5. The weighted mean score for the benefits of urban green areas in Kota Kinabalu is indicated respectively, as shown in Table 2. Among the given statements, the top 5 ranking of the respondent's perception of the benefits of urban greens in Kota Kinabalu were the '*improving physical well-being of urban dweller*', with a mean score (μ) of 4.27 (rank 1), followed by the fact that the urban greens can help in '*regulate the urban temperature during sunny days*' with a mean score 4.20 (rank 2), thirdly, '*encourage people to spend more time on outdoor activities in nature*' was 4.14 (rank 3). While, the fourth is, '*help in removing air pollutants*' was 4.09 (rank 4) and lastly, fifth is help in '*controlling the amount of water on the ground surface during the rainy season*' with a mean score of 4.06 was rank 5 as shown in Table 2.

3.3 Correlation analysis of mean benefits of urban green in Kota Kinabalu.

The correlation analysis of the mean benefits of urban green in Kota Kinabalu did not show much effect between the demography items as shown in Table 3 below. However, only one, which is marked by an asterisk and highlighted in bold, shows a positive relationship that is the respondents' education versus the mean benefits of the green area which is significant ($p < 0.05$). Nevertheless, the correlation coefficient value between these two variables is $r^2 = 0.241$, which means a very weak relationship (refer to Table 3). While, compared to other variables, this indicated, that the education of respondents has little impact on respondents' perception towards the benefits of urban green provided to them.

Table 1. Demography analysis of the respondents examined in this study.

Demography	Item	Percentage (%)	Demography	Item	Percentage (%)
1. Gender	Male	75.20	6. Marital Status	Single	90.10
	Female	24.80		Married	8.90
				Divorce	1.00
2. Nationality	Sabah	71.30	7. Education	No Formal education	2.00
	Sarawak	21.80		Primary school	3.00
	Peninsular	5.00		Secondary school	7.90
	Malaysia	2.00		College / technical	14.90
	Other			Diploma	11.90
				High-level education	60.40
3. Age	Below 20	16.80	8. Occupation	Government employee	4.00
	21 – 30	73.30		Private sector	5.90
	31 – 40	5.00		Business	8.90
	41 – 50	3.00		NGO's	2.00
	50 – 60	1.00		Self-employment	6.90
	60 and above	1.00		Students	71.30
4. Religion	Islam	32.70		Other	1.00
	Christian	61.40	9. Household Income	Less than RM1000	2.00
	Buddhism	4.00		RM1000 – RM3000	57.40
	Hindu	2.00		RM3000 - RM5000	38.60
	None	-		Above RM5000	2.00
5. Races	Sabah ethnic*	56.40	10. Distance	Less than 5km	38.82
	Sarawak	21.80		5-15km	40.13
	Malay	7.90		16-25km	9.21
	Chinese	8.90		More than 25km	11.84
	Sino	4.00			
	Other	1.00			

Note: Sabah ethnic* = Bumiputra Sabah (around 35 sub-ethnic groups, whereas Kadazan-Dusun-Murut are the highest)

Table 2. The benefits of urban green areas in Kota Kinabalu.

Rank	Urban Green Benefits	N	Min	Max	Score Mean (μ)	Standard deviation
1	Improve physical well-being of urban dweller	101	1	5	4.27	1.067
2	Regulate the urban temperature during sunny days	101	1	5	4.20	1.114
3	Encourage people to spend more time on outdoor activities in nature	101	1	5	4.14	1.059
4	Help to remove air pollutants	101	1	5	4.09	1.114
5	Control the amount of water on the ground surface during the rainy season	101	1	5	4.06	1.094
6	Reduce stress, anxiety, and depression	101	1	5	4.04	1.166
7	Prevent the occurrence of a flash flood	101	1	5	3.98	1.140
8	Promote social interactions among people	101	1	5	3.81	1.129
Total					4.074	1.110

Note: Likert mean score indicated, 5 = Strongly agree, 4= Agree, 3 Fair, 2= Disagree and 1 = Strongly disagree

Table 3. Correlation analysis of demographic variable and mean benefits of urban green in Kota Kinabalu.

Demography	Spearman's Rank Correlation (ρ)	Mean Benefits
Gender	Correlation Coefficient	-0.125
	Sig. (2-tailed)	0.212
Nationality	Correlation Coefficient	-0.047
	Sig. (2-tailed)	0.639
Age	Correlation Coefficient	0.118
	Sig. (2-tailed)	0.241
Races	Correlation Coefficient	-0.141
	Sig. (2-tailed)	0.159
Religion	Correlation Coefficient	0.034
	Sig. (2-tailed)	0.739
Marital Status	Correlation Coefficient	-0.047
	Sig. (2-tailed)	0.638
Education	Correlation Coefficient	0.241*
	Sig. (2-tailed)	0.015
Occupation	Correlation Coefficient	0.058
	Sig. (2-tailed)	0.566
Income	Correlation Coefficient	0.078
	Sig. (2-tailed)	0.439

*Note: *=Spearman's Rank Correlation is significant at the 0.05 level (2-tailed).

4. Discussion

The finding of the study highlighted that most of the respondent's perception that the urban greens could help to improve the physical well-being of the urban dwellers, regulate the urban temperature during sunny days, encourage people to spend more time on outdoor activities in nature, help to remove air pollutants, control the amount of water on the ground surface during the rainy season, reduce stress, anxiety, and depression, prevent the occurrence of a flash flood, and promote social interactions among people. Additionally, the urban trees provide additional direct and indirect health and wellness benefits to humans, such as clean air and the environment [6]. The removal of toxic chemicals is just one of the many ways that urban trees improve air quality. The management of urban tree canopy cover could be a viable strategy to improve air quality and help meet clean air standards, according to integrated studies of tree effects on air pollution [14]. The tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil. Trees are natural managers of stormwater, it can improve infiltration and capacity, reducing the overall amount of runoff. Rainwater that falls on trees evaporates or drips to the ground below, where it can soak into the soil [15]. Surface water from the surrounding area can also flow into the permeable area around the trees, increasing the amount of water that can soak away and reducing the demand on stormwater drains.

The Urban Heat Island becoming an increasingly heat-related health problem in cities. Temperatures in built environments can be reduced by strategically placed trees. Urban trees not only provide shade by intercepting and absorbing light, but they also actively cool the air in cities through evapotranspiration [16,17]. In urban areas, such as recreational parks, trees can be used to bring people together for educational purposes. They also make it possible to engage in activities such as walking or birdwatching. They also provide a safe environment for children to play and experience a sense of adventure. Most of the respondents agreed with the statement trees and greenery environments help to reduce negative thoughts, depression symptoms and increase life satisfaction [16,18].

5. Conclusion

Urban greens, particularly urban trees in parks, provide many functions, services, and benefits that are needed for the sustainable development of urban areas. There is eight (8) important statement regarding the benefits of urban trees in Kota Kinabalu. Most of the respondents strongly agreed that the urban trees could help to improve the physical well-being of the urban dwellers (Mean Score, $\mu=4.27$), regulate

the urban temperature during sunny days ($\mu=4.20$), encourage people to spend more time on outdoor activities in nature ($\mu=4.14$), help to remove air pollutants ($\mu=4.09$), control the amount of water on the ground surface during the rainy season ($\mu=4.06$), reduce stress, anxiety, and depression ($\mu=4.04$), prevent the occurrence of a flash flood ($\mu=3.98$), and promote social interactions among people ($\mu=3.81$). There is a relationship between respondents' education and mean benefits of green area in Kota Kinabalu with a significant level value at $p < 0.05$. Overall, the perception of people about the benefits of urban trees in Kota Kinabalu is mostly positive. The majority of them have a lot of understanding about its benefits to the city dwellers. Henceforth, there is a need to conduct further research to fill up this particular research gap, especially for the ecosystem services and willingness to accept for payment of urban greens ecosystem in the future.

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