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Cawangan Perak
Kampus Seri Iskandar

e-Proceeding
v-GOGREEN2020
29 - 30 SEPT

VIRTUAL GO-GREEN: **CONFERENCE & PUBLICATION**

"SUSTAINABLE ENVIRONMENT, RESILIENCE AND SOCIAL WELL-BEING"

Organiser :
Research, Industrial Linkages, Community &
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Faculty of Architecture, Planning and Surveying (FSPU)
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Publication Date : 22nd February 2021

Virtual Go-Green Conference and Publication 2020
UNIVERSITI TEKNOLOGI MARA, PERAK BRANCH
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THE APPLICATION OF UNMANNED AERIAL VEHICLE FOR MEASURING GREENING-SUSTAINABLE RESIDENTIAL: TREE CANOPY MAPPING

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Abstract

Trees and plants play an important role in promoting a greening-sustainable residential environment. They keep cool, fresh and beautiful environments and subsequently, make people healthier, happier, safer and more productive. As a key indicator of green space planning, there is a need to measure it. The current paper attempts to measure tree canopy cover in residential neighborhood areas by using GIS-based Unmanned Aerial Vehicle (UAV). To seek for the purpose, Puncak Iskandar has been selected for the case study. The study has found that many types of tree canopy have been planted along streets, but they were not sufficient enough according to the residents' size. This paper provides a significant measure and relevant findings to assist urban planners or stakeholders in planning and managing trees in particular in the case study and urban areas in general, towards promoting greening-sustainable living environment.

Keywords: *unmanned aerial vehicle; tree crown; urban planning; sustainable*

1.0 INTRODUCTION

Trees crown or tree canopy plays an important role for people and all life on the earth surface to maintain healthier, happier and be more productive (Jacbos et al., 2014). Previous studies have demonstrated that the presence of trees crown can improve physical health of human, the attention and test scores of children, the value of property of neighborhood, reduced heating and cooling demands and reduced storm water runoff (Turner-Skoff & Cavender, 2019; Matasci et al., 2018; Lesher et al., 2014). The tree crown in the urban area, in particular in neighbourhood areas is intended to raise the consciousness of the positive effects and their benefits to the population. Human and environmental factors are very significant elements to an urban planner in which to understand and search the information to improve residential neighborhood design and guide a better understanding in planning and planting of tree canopy for urban development (Lowry et al., 2012).

Inspired by this, the current paper aims to measure the tree canopy covers in the neighbourhood level by using GIS-based Unmanned Aerial Vehicle (UAV). Measuring the tree canopy covers at this level can help a deeper understanding of tree canopy at a meaningful purpose for facilitating and increasing the green spaces in the future (Davey Resource Group, 2015). This paper only provides a surface geospatial analysis result (mapping), but the

information given will benefit community members and stakeholders to reflect their needs in undertaking green space planning and planting.

2.0 LITERATURE REVIEW

The canopy of trees becomes an important element in neighborhood areas for physical and socio-economical and human health (Nowak & Greenfield, 2012). It provides green spaces that are critical in the proper operating of towns, influencing the quality of life of their inhabitants. The increasing tree canopy is one of the most cost-effective strategies to reduce the effects of urbanization such as hot islands, excessive use of electricity for heating and cooling buildings and daily pressure (Bravo-Bello et al., 2020).

Usually, the tree canopy information is generated through the interpretation of aerial photographs or images like LiDAR, Airborne Laser Scanning (ALS), satellite and field inventories. Unfortunately, it is time consuming, very expensive and needs trained personnel in data collection and image processing. Nowadays, the availability of unmanned aerial vehicle (UAV) technology allows urban planners to evaluate the effectiveness of tree canopy for urban planning decision-making, with the advantage of acquiring data in less time and provide a very high-resolution image (Niluka et al., 2016).

3.0 RESEARCH METHODOLOGY

The study area comprises the residential neighborhood of Puncak Iskandar, Perak with an area of 61.523 hectare which is located at latitude 4° 22' 26.4"N and longitude 100° 57' 30.24"E (Figure 1). Puncak Iskandar is among the attractive residential neighbourhoods in Seri Iskandar, due to its modern layout and housing design and multiple types of residential to cater to the population needs. The following is the discussions on the methodology process, which is organized into three stages, namely, data acquisition, data processing and results.

Figure 1: Study area located at Puncak Iskandar, Seri Iskandar, Perak
Source: Keyhole (2018)

3.1 Data Acquisition

The data acquisition was conducted in an experimental approach using UAV DJI Phantom 4 pro to capture the area of Puncak Iskandar. The 990 images were captured and covered the Puncak Iskandar area with stereo camera views at 150 m flying altitude. In this paper, the flight planning was designed by using DJI Go software, which interconnected with the UAV through wireless remote controllers. Moreover, the percentage of images overlapping was also set before the flight mission. In this case, the images were captured at 150m flying altitude as shown in Figure 2.

Figure 2: Images derived from UAV at 150 meter flying altitude

3.2 Image Processing

The Agisoft Photoscan Professional software was used for producing the mapping product. The UAV RGB images collected were processed to generate DSM and orthophoto. All the acquired images undertaken from UAV were imported into the Agisoft Photoscan software, and subsequently, the photo alignment was performed based on the images inserted. The alignment function is based on the computer vision concept which is to ensure all the photo overlays are connected and fit together. The build dense cloud is the process to calculate the depth information for each camera. The next process is to generate a 3D model, the so-called building mesh to create DSM and orthophoto. Figure 3 shows the image processing using Agisoft software. The product of orthophoto will be used for result and analysis stages. In this paper, the ArcGIS software was used to produce the result and analysis process.
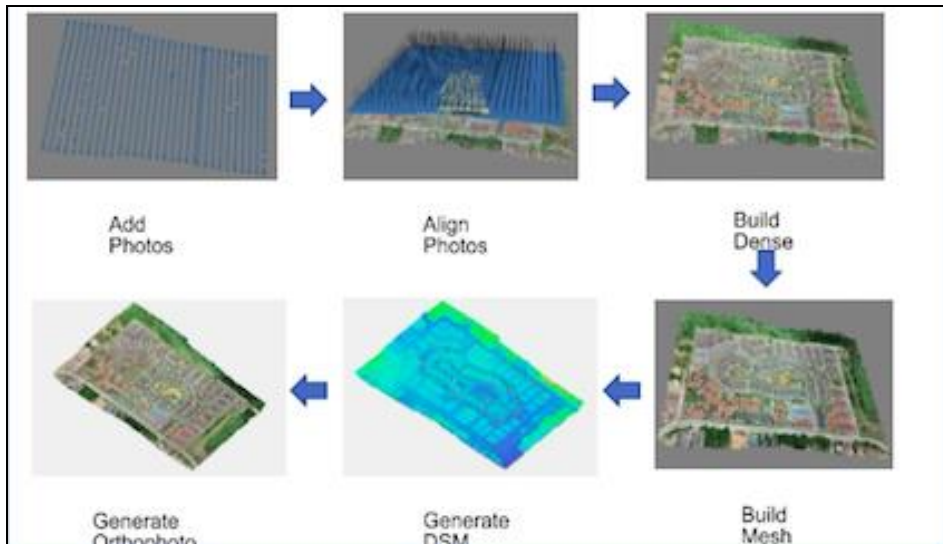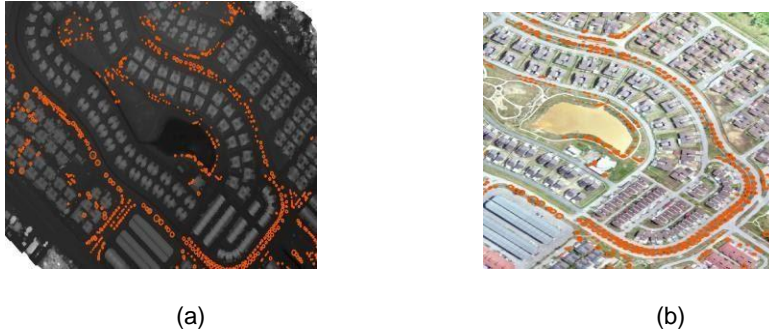

Figure 3: The process of image processing

4.0 RESULTS AND DISCUSSION

From the results, it can be seen that all the trees have been planted along streets in Taman Puncak Iskandar (Figure 4). However, concerning the residents' size of the neighborhood area, the tree canopy cover was not sufficient enough.

(a)   (b)

Figure 4: Tree Crown Overlay with (a) DSM Data (b) Orthophoto Data

(a)   (b)

Figure 5: The Location of Tree Crown Planted and non-Planted (a) without Orthophoto (b) with Orthophoto

This is, according to the guideline provided by the National Landscape Department, where a single tree crown should cover for every two houses units. Besides that, the tree planting distance should be at the range of 30 ft to 40 ft. As shown in Figure 5, the pink color represents the non-planted areas, while the green color represents the existing tree crown planted. So, it shows that many areas are still left and not fulfilled with the tree canopy to make greener areas. In addition to that, the existing tree crowns along the road mostly the sparse crown which do not fulfill the distance as implied.

5.0 CONCLUSIONS

This paper discovered the measurement results of the tree canopy cover using GIS-based technologies. The results are sufficient to provide urban planners or stakeholders on the present scenario of the trees planting in the case study. So, there is a need for further intervention in trees planning and planting in a neighborhood area. Other than that, urban residents need to recognize and voice the importance of trees as a component of the neighbourhood environment. Planting and practicing the appropriate street tree canopy are very crucial in reducing the conflict between the people and the environment. The selection and care of trees such as well-planned tree planting patterns can be obtained from many resources.

Planting suitable trees with the appropriate distance based on guidelines will prevent any problems in the future. Moreover, the selection of trees compatible with the planting location is

improving, when people give greater visibility to screen for the potential of the tree canopy. Maybe these important understandings should be applied among associated organizations. This makes the neighborhood area a better and safer place to live, play and work.

REFERENCES

Bravo-Bello, J. C., Martinez-Trinidad, T., Valdez-Lazalde, J. R., Romero-Sanchez, M. E., & Martinez-Trinidad, S. (2020). Analyzing Potential Tree-Planting Sites and Tree Coverage in Mexico City using Satellite Imagery. Forests, 11(4), 1–12. https://doi.org/10.3390/F11040423.

Davey Resource Group. (2015). Urban Tree Canopy Assessment: A Component of the Citrus Heights Urban Greening Strategy (CHUGS). California. Retrieved from http://louisvilleky.gov/sites/default/files/sustainability/pdf_files/louisvilleutcreport -24march2015.pdf.

Jacbos, B., Mikhailovich, N., & Delaney, C. (2014). Benchmarking Australia's Urban Tree Canopy: An i-Tree Assessment. Sydney. Retrieved from www.isf.uts.edu.au.

Keyhole. (2018). Puncak Iskandar, Bandar Seri Iskandar, Perak.pdf.

Lesher, A., Rosenbloom, J., & Duerksen, C. (2014). Tree Canopy Cover. Retrieved August 24, 2020, from https://sustainablecitycode.org/about/.

Lowry, J. H., Baker, M. E., & Ramsey, D. (2012). Determinants of Urban Tree Canopy in Residential Neighborhoods: Household Characteristics, Rrban Form, and The Geophysical Landscape. Urban Ecosystems, 15(1), 247–266. https://doi.org/10.1007/s11252-011-0185-4.

Matasci, G., Coops, N. C., Williams, D. A. R., & Page, N. (2018). Mapping Tree Canopies in Urban Environments using Airborne Laser Scanning (ALS): A Vancouver Case Study. Forest Ecosystems, 5(1). https://doi.org/10.1186/s40663-018-0146-y

Niluka, M., U I, M., Premasiri, H. M. ., N, L. D., Madawalagama, S. l, & Samarakoon, L. (2016). Developing Methodology to Map Tree Canopy in Urban Areas From Low Cost Commercials UAVs. In 37th Asian Conference of Remote Sensing (Vol. Colombo, p. 7). Columbo. Retrieved from https://www.researchgate.net/publication/309349770_DEVELOPING_METHODOLOGY_TO_MAP_TREE_CANOPY_IN_URBAN_AREAS_FROM_LOW_COST_COMMERCIAL_UAVS

Nowak, D. J., & Greenfield, E. J. (2012). Tree and Impervious Cover in The United States. Landscape and Urban Planning, 107(1), 21–30. https://doi.org/10.1016/j.landurbplan.2012.04.005

Turner-Skoff, J. B., & Cavender, N. (2019). The Benefits of Trees for Livable and Sustainable Communities. Plants, People, Planet, 1(4), 323–335. https://doi.org/10.1002/ppp3.39

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Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Setuju.

27.1.2023

Saya yang menjalankan amanah,

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