

Research on the investigation of urban greenery using aerial laser surveys

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1. Introduction

Green plants are an important element for developing a favorable urban environment. A quantitative evaluation of the effects of greenery is needed to effectively introduce the various functions of urban green areas. Making it visible to see how nearby greenery is positively affecting the surrounding environment leads to a deepening of the understanding of landowners and an increase in the awareness of local residents when expanding green areas on privately owned land that occupies the major part of urban areas. It also becomes the ground data for presenting the effects of greening policies.

Today, local public organizations are investigating green coverage rates using aerial photographs when they investigate the conditions of green areas. The investigation of the green coverage rate enabled the identification of the total amount of urban greenery. This therefore clarified the fact that green areas have been decreasing. A quantitative evaluation method to measure the effects of greenery and the advancement of methods to measure green areas are necessary to maximize the effects of remaining greens and to increase green areas again.

This study examined the advancement of methods to measure green areas using aerial laser surveys to quantitatively evaluate the effect of green areas in the urban environment.

2. Investigation of green areas using aerial laser surveys

Laser surveying (LiDAR) is a technology to measure the distance from a target using a laser. Aerial laser surveys enable the three-dimensional identification of trees and buildings on the ground and terrain as the data of point groups (figure 1). Figure 2 shows an example of creating tree-height models (DCHM) that express the three-dimensional quantity of greenery by processing data obtained through aerial laser surveys. The surveys enable the three-dimensional capture of the conditions of green areas, which used to be limited to the identification of the plane surface distribution of greenery in investigations based on conventional aerial photographs. Among the green areas, the effect of reducing the thermal environment differs between turf and trees. The three-dimensional survey of the amount of greenery enables the evaluation of these differences.



Figure 1. An example of point group data of aerial laser surveying

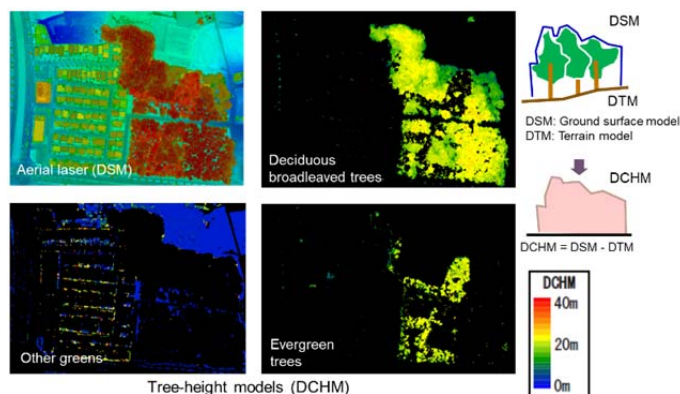


Figure 2. Three-dimensional green surveying

3. Conclusion

A more detailed analysis requires the categorization of the types of greenery identified as values based on functions. This study developed a method to estimate the necessary parameter of trees to run numerical simulations of the urban environment based on the effects of trees using aerial laser survey data and examined simple methods to evaluate the thermal environment improvement effects of urban green areas and the indirect effects of reducing carbon.

Survey methods that enable the quantitative evaluation of other functions of green areas are going to be developed in the future.

☞ For more detailed information

1) Website of Urban Planning Division (Identification and evaluation of urban greens)

<http://www.nilim.go.jp/lab/jbg/green/green.html>