

# Fact-Finding Survey of Urban Greenery and Temperatures

(Period of Study: From FY 2015 to FY 2017)

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## 1. Introduction

The National Institute for Land and Infrastructure Management (NILIM) has been carrying out a study<sup>1</sup> concerning the development of methods to evaluate low-carbon urban development by improving the urban thermal environment using greenery.

The purpose of this study is to clarify what effects the greenery of urban green spaces and parks may have on an improvement in the surrounding thermal environment and to develop a method for quantitatively evaluating indirect low-carbon effects through a reduction in the heating and cooling load of a building that has been achieved by improving the heating environment.

The effects of greenery on the improvement of the thermal environment are expected to be prominently observed primarily during summer, such as alleviating the heat island phenomenon, but how they work in low temperatures during winter is not sufficiently clear because there are only a few case studies available in this respect.

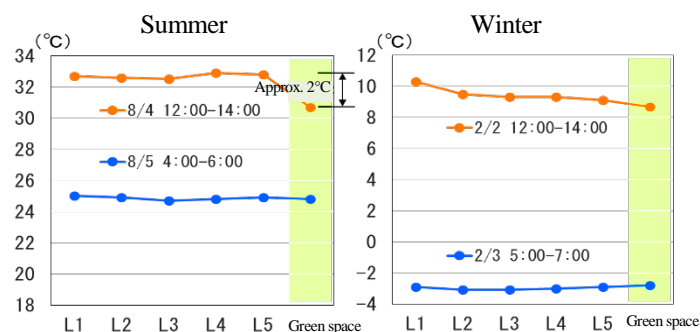
In order to investigate the actual situation of the effects of greenery on temperatures in surrounding areas throughout the year by factoring in seasonal changes in greenery, we conducted a fact-finding survey in areas surrounding a green space during summer and winter.

## 2. Overview of Fact-Finding Survey

We surveyed the preservation green space and neighboring residential area in Kenkyugakuen, Tsukubashi, Ibaraki Prefecture (Figure 1).



**Figure 1.** Locations of surveyed area and temperature observation spots



**Figure 2.** Measurement results of temperatures

The fact-finding survey was conducted twice—in February (winter) and August (summer) of 2016—with the cooperation of the local government and community residents. Figure 2 shows temperatures measured during the survey.

It was confirmed that a green space provided a cool spot, with the average temperature in the green space (average temperature in observation spots B to G) lower by about two degrees centigrade during daytime in summer than in the residential area. On the other hand, there was not much difference in the average temperature between the green space and the residential area during winter. In addition, it was observed that, within the same green space, evergreen trees tended to be more effective in alleviating changes in temperature during winter than deciduous trees.

Furthermore, we quantitatively clarified seasonal changes in the volume of greenery, by measuring the conditions of greenery using airborne laser bathymetry and preparing a digital canopy height model (DCHM) for each category of tree species, such as an evergreen tree and a deciduous tree.

## 3. Next Step

In FY 2017, we will continue to support local governments' efforts to promote low carbon urban development utilizing greenery by clarifying, through a detailed analysis of the survey results, the effects of greenery on the improvement of the thermal environment factoring in seasonal changes of greenery, and by developing methods for converting such effects into low-carbon effects.

For more information, please visit the following website:

1) The website of Urban Planning Division, Urban Planning Department, NILIM

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