



Estimation Carbon Storage of Urban Street Trees Using UAV Oblique Photography

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Street tree is one of the important parts of urban facilities, and they can provide aesthetical and ecological benefits for urban environments. Ecological benefits of street trees are now attracting more attention because of environmental deterioration in cities. Conventional method in calculating the carbon storage of street trees has been to personally collect data on the field. Since the conventional method is labor intensive for macro scale research, remote sensing has been more widely used. The airborne Light Detection And Ranging (LiDAR) is commonly used in obtaining the point cloud data of a densely planted area and extracting individual trees for carbon storage estimation. However, the LiDAR has limitations such as high cost, low efficiency, and complicated operations. So, Unmanned Aerial Vehicle (UAV) is more suitable method for obtaining point cloud data of street trees. In this paper, an UAV loaded with a digital camera was employed to take oblique photographs of street trees in Seoul National University campus. We extracted morphological parameters of individual street trees to estimate the carbon storage. Morphological parameters include tree height and diameter at breast height (DBH). These morphological data were used to calculate the allometric equation for the tree species provided by Korea Forest Research Institute. To assess the accuracy of results, we selected randomly the test site in study area. We compared the calculated carbon storage from UAV data with from measured data on the field in the selected area. R square and RMSE of the estimated carbon storage of individual trees were 0.94 and 20.5 kg. The results demonstrated the feasibility and effectiveness of applying UAV-acquired oblique optical photographs to the carbon storage estimation of street trees in urban area.