Chapter 12
Application of Conventional UAVs for the Identification and Classification of Dense Green Spaces

Josep Roca
https://orcid.org/0000-0003-3970-6505
Technical University of Catalonia (CPSV), Spain

Blanca Arellano
Technical University of Catalonia (CPSV), Spain

ABSTRACT

The objective of this chapter is to show the usefulness of conventional UAVs for the identification, inventory, and classification of trees in the context of dense green spaces. The aim is to demonstrate the potential of low-cost drones (with traditional red, green, blue [RGB] sensors) to identify and classify trees in public parks. A case study is discussed on Turó Parc in Barcelona, in which a 3D model was developed and an exercise to identify and classify the vegetation was carried out using the information provided by a UAV. The example confirms that conventional drones could be useful for studying green urban spaces characterized by a high density of plant species. Non-professional UAVs have a potential that should not be undervalued, as they enable three-dimensional point clouds to be obtained of high spatial density.

DOI: 10.4018/978-1-7998-2249-3.ch012

INTRODUCTION

The special significance of green spaces in cities has been fully demonstrated. Recent studies have supported an increase in green spaces and a greater commitment to health promotion policies (Nieuwenhuijsen et al., 2017; van den Bosch and Nieuwenhuijsen, 2017). The inhabitants of cities are exposed to environmental pollution, which may critically affect their health (Shrestha et al., 2016). Increasing the number of green spaces is a measure that mitigates the loss of natural environments within cities due to densification processes and improves human health and the well-being of a large section of urbanized societies (Dallimer et al., 2011; Pauleit et al., 2005). Green spaces are key elements to improve the quality of urban life. They contribute to human well-being by providing ecosystem services such as climate regulation, the capture of pollutants or flood control. They also promote contact between residents and community integration, and offer a favourable place for health, relaxation and contemplation of nature (Chiesura, 2004; Lee and Maheswaran, 2011; Dobbs et al., 2014; Larondelle et al., 2014; Carrus et al., 2015; Marselle et al., 2015). In addition, greener environments have lower crime rates (Kuo and Sullivan, 2001). They tend to have a positive effect on people and induce mental vitality (Takayama et al., 2014). Green spaces can help to reduce urban heat islands and generate true cold islands in urbanized environments (Norton et al., 2015; Arellano and Roca, 2018; García and Arellano, 2018). Finally, urban parks provide economic value for cities, including an increase in the value of properties in their proximity (Roca, 1988; Harnik and Crompton, 2014).

The study of urban green space has developed exponentially with the use of satellite and airborne sensors. In particular, the analysis of the Normalized Difference Vegetation Index (NDVI), Leaf Area Index (LAI), Fraction of Photosynthetically Absorbed Aadiation (FAPAR) and Fractional Vegetation Cover (fcover) have revealed the quality of urban vegetation with a high level of detail. At the same time, aerial and satellite images with high radiometric and spatial resolution have been used to draw up inventories of trees in cities, and even to determine the trees' biological health status (http://iarbol.starlab.es). However, the use of high-resolution satellites and conventional aerial flights to obtain data is usually economically inaccessible. In addition, it can be difficult to identify and classify trees from the data that is collected: it is hard to interpret the results when the vegetation is very dense, as is often the case in urban parks. For this reason, using remote sensing to catalogue trees in urban parks is not straightforward. For example, Barcelona has a magnificent inventory of trees on public roads (https://opendata-ajuntament.barcelona.cat/data/en/dataset/arbrat-viari) but does not have a similar inventory for the dense vegetation of urban parks.

Land Use Planning and Management in Tank Cascade Environment of Sri Lanka

Muditha Prasannajith Pereraand K. W. G. Rekha Nianthi (2021). *Examining International Land Use Policies, Changes, and Conflicts (pp. 310-329).*
www.irma-international.org/chapter/land-use-planning-and-management-in-tank-cascade-environment-of-sri-lanka/266006