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“Filling gaps and removing traps
for sustainable resource management”

The Use of Aerial Photographs as a Tool for Landscape Analysis in an Oil Palm Plantation

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Abstract

In Colombia, the oil palm sector is growing as an important economic sector. Its challenge is to ensure the growth of the palm oil production and maintain or improve the environment and the local landscape. The Macondo oil palm plantation is located in in Mapiripán, Meta, and is 5800 ha large. Landscape analysis is done to show the diversity of natural elements, the complexity and connectivity of the oil palm plantation. The aim of this paper is to explore the use of aerial pictures in landscape analysis. Using the aerial pictures to reduce time in ground-truthing, and simultaneously, collecting useful information for landscape analysis. Besides, it allows us to obtain “real time” pictures in spatio-temporal scales. The landscape analysis was based on a GIS analysis of the land cover maps of 2009. Using landscape metrics, we applied a raster of squares of 500x500 meters over the plantation area. The squares were classified using the cluster analysis according to similarities in land cover into 9 groups. Four squares per group were selected to obtain 36 squares. Using a DJI drone, Mavic Pro 2, camera 20 mpx, RGB, we took over 10800 aerial photophraphs at a height of 100 meters to create the aerial map for each selected square. The landscape analysis showed that the plantation as a landscape can be divided into 9 different groups. They differ in terms of diversity in natural elements and land cover. The pictures realised by the drone enabled us to conduct a quick and effective “real-time” ground-truthing. Furthermore, using the aerial maps allowed to observe the horizontal structure of the landscape for 2019 and contrast information of 2009. Furthermore, working with good resolution 3D models and landscape indices it could give significant results on the vertical structure. Thus, using drone-made pictures is relevant for science since it provides landscape detailed information in a reduced time range. Therefore, the pictures can help with landscape monitoring within the plantations, and identify the related ecosystem services. This characterisation allows the comprehension of the landscape and the local ecosystems.

Keywords: Aerial photographs, cluster analysis, landscape analysis, landscape metrics