



## **Classification of non native tree species in Adda Park (Italy) through multispectral and multitemporal surveys from UAV**

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The project ITACA (Innovation, Technologies, Actions to Contrast Alloctonous species) rises from the need of protecting natural habitats in parks where native vegetation is threaten by the always increasing spread of alloctonous species.

Starting from preliminary results obtained in previous experimental studies performed inside Adda Park (Lombardy Region, Northern Italy) the aim of the project is a further development and optimization of some tested techniques and procedures.

In the frame of ITACA project, that involves Politecnico di Milano and some local enterprises, 11 separate areas of the Adda Park, globally covering 50 hectares, will be surveyed with UAV-borne multispectral sensors through different seasons (summer, autumn and spring).

The summer and autumn flights have already been realized by the fixed wing UAV Sensefly SwingletCAM mounted with a Canon Ixus 220HS, producing real color images (RGB), and an identical camera, modified to produce false color images (NIR-RG).

The 'multisensor-multitemporal' flights have been planned with high longitudinal and transversal overlaps, always in the range 60% to 80%, and a GSD of around 4 cm.

Presignalized artificial points or natural elements have been surveyed on the ground by GPS RTK Trimble 5700, making use a Network GPS service (NRTK).

For each survey two flights have been realized, one with the standard camera, and the second one with the NIR-modified one, with the double purpose of:

- producing a multispectral orthomosaic, formed by the four bands NIR-R-G-B, coregistered.
- increasing the coverage of the area, yielding in the block adjustment phase a more robust solution and a higher metric accuracy of digital products (digital orthomosaics).

The first two flights have been scheduled taking into account information on the phenology of the species under observation (both native or invasive) given by expert botanists involved in the project.

The first set of acquisition, originally planned for the first half of July, was realized over a longer period : from 09/07/2013 to 28/08/2013, due to weather condition and technical reasons. In any case the vegetation characteristics resulted to be unchanged.

The second set of flights, in autumn, were done in a shorter period, during the days 16-17-18 October 2013, thus obtaining even better homogeneity of the vegetation conditions.

Image and data processing are based on standard classification techniques, both pixel and object based, applied simultaneously on multispectral and multitemporal data, with the aim of producing a thematic map of the species of interest. The classification accuracies will be computed on the basis of ground truth comparison, to study possible misclassification among species.