Mapping of endangered swamp species from a UAV-hyperspectral system

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Abstract:
Upland swamps in the Sydney Basin Bioregion are ecological communities associated with periodically waterlogged soils on Hawkesbury sandstone. These swamps are characterised by highly diverse and variable mosaics of endangered vegetation species and at the same time provides habitat to a wide variety of birds, mammals, amphibians, reptiles and invertebrate species (NPWS, 2003). Mapping of endangered vegetation species and communities in a sensitive upland swamp ecosystem is essential for identification and management of anthropogenic impacts. UAV-hyperspectral systems are among the latest technologies in remote sensing that hold a potential for obtaining the unprecedented quality of remote sensing data for vegetation mapping and health status monitoring applications. The first step in this study, a tunable snapshot type Fabry–Pérot interferometer (Rikola™) was integrated with an octocopter-UAV (Walkera™ QR-X900). Secondly, high-resolution (1-1.5 cm) hypercubes (15 bands) were acquired from a tunable spectrometer over shrub type Thickets (Banksia and Tea Tree) and Sedgeland-Heath Complexes (Cyperoid, Restioid, and Sedgelands) in an upland swamp environment. Thirdly, the systematic corrections (spectral smile and dark signal), reflectance correction and geometric registration were applied on the acquired hypercubes as a part of the data pre-processing routine. Finally, the dataset was classified using a supervised classification workflow to map vegetation species from the shrub type Thickets and Sedgeland-Heath Complexes. UAV-hyperspectral technology is identified as an effective tool to identify and map sensitive swamp vegetation. In addition, this technology can also be potentially applied to determine the health status of the species.

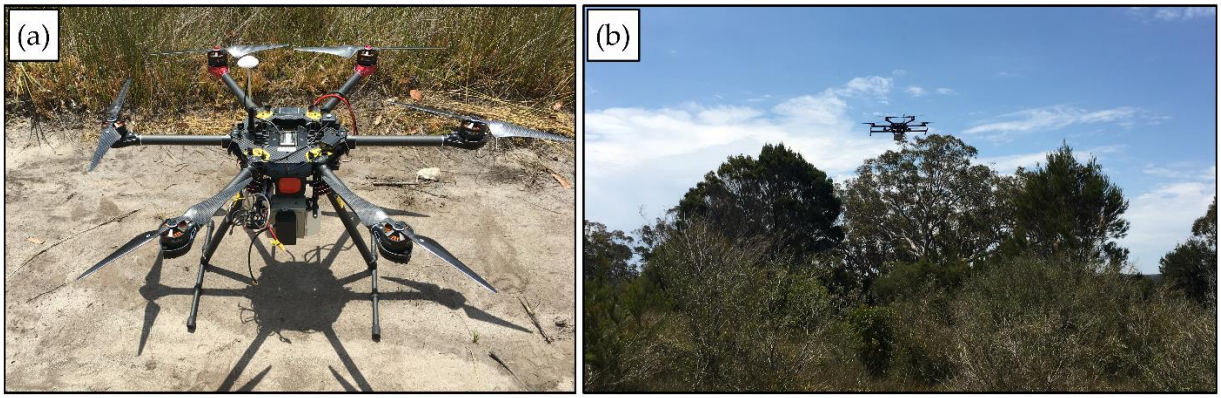

Figure 1. An integrated UAV-hyperspectral sensor system (a) on-ground, and (b) during the survey.

References:

NPWS, N. 2003. The native vegetation of the Woronora, O'Hares and Metropolitan Catchments. *NSW National Parks and Wildlife Service, Sydney*.