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TITLE: Hyperspectral Data for Mangrove Species Mapping: A Comparison of Pixel-Based and Object-Based Approach

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ABSTRACT:

Visual image interpretation and digital image classification have been used to map and monitor mangrove extent and composition for decades. The presence of a high-spatial resolution hyperspectral sensor can potentially improve our ability to differentiate mangrove species. However, little research has explored the use of pixel-based and object-based approaches on high-spatial hyperspectral datasets for this purpose. This study assessed the ability of CASI-2 data for mangrove species mapping using pixel-based and object-based approaches at the mouth of the Brisbane River area, southeast Queensland, Australia. Three mapping techniques used in this study: spectral angle mapper (SAM) and linear spectral unmixing (LSU) for the pixel-based approaches, and multi-scale segmentation for the object-based image analysis (OBIA). The endmembers for the pixel-based approach were collected based on existing vegetation community map. Nine targeted classes were mapped in the study area from each approach, including three mangrove species: Avicennia marina, Rhizophora stylosa, and Ceriops australis. The mapping results showed that SAM produced accurate class polygons with only few unclassified pixels (overall accuracy 69%, Kappa 0.57), the LSU resulted in a patchy polygon pattern with many unclassified pixels (overall accuracy 56%, Kappa 0.41), and the object-based mapping produced the most accurate results (overall accuracy 76%, Kappa 0.67). Our results demonstrated that the object-based approach, which combined a rule-based and nearest-neighbor classification method, was the best classifier to map mangrove species and its adjacent environments.

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