EXTRACTION OF MULTI-SCALE MANGROVE FEATURES FROM WORLDVIEW-2 IMAGE DATA: AN OBJECT-BASED IMAGE ANALYSIS APPROACH

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Abstract: Providing information on the composition and structural properties of mangroves at multiple spatial scales is essential to support conservation and management actions. In any of remote sensing application, mapping, monitoring or modelling problem at the right spatial scale is paramount. One of the advantages of remote sensing is its ability to deliver data or information at multiple spatial scales. However, a problem arises when there is a need to match the scale of analysis to the scale of phenomenon under investigation. This study focuses on the fitness of image spatial resolution for extracting mangrove information across different spatial scales. This work is an exploratory study, implementing a multi-scale approach on WorldView-2 image data to map mangrove structural features (e.g. tree canopy, gaps, formation, etc.) at different spatial scales. The study sites were the mangroves areas of Moreton Bay, Brisbane, Australia. To enable comparison of different spatial scales (i.e. pixel sizes), the image data were resampled into six different pixel sizes (0.5, 1, 2, 4, 8 and 10 m) using pixel averaging filter. We used object-based image analysis (OBIA) approach to segment and discriminate multi-dimension mangrove features based on the original and resampled WorldView-2 images. The ability of OBIA approach to incorporate multiple scales in the analysis through multi-scale segmentation process provides essential support to analyse multi-scale features in mangrove mapping. Our results show that information within mangrove stands can only be mapped using pixel sizes of 2 m or smaller, including single shrub crown, foliage clumping, canopy gaps, and single tree crown. Whereas pixel sizes larger than 2 m are more appropriate for larger features dimension, such as double tree crowns, larger gaps, and vegetation formation or community. The results provide guidance to determine the optimum image pixel size to map a specific mangrove feature.

Keywords: mangroves, multi-scale, mapping, OBIA, WorldView-2.

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