

Mapping the distribution of a rapidly spreading alien invasive plant (*Melia azedarach*) using remote sensing

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Abstract

Invasive alien plants are considered one of the major threats to biodiversity conservation worldwide. Hence understanding their distribution and abundance is important in order to assess the impact on native ecosystems. It is particularly important to be able to track the progress of invasive species across landscapes; a task best achieved using remotely sensed imagery.

This study aims to classify woody species with a focus on *Melia azedarach* (Meliaceae) trees in a moderately invaded coastal belt valley on the east coast of South Africa using WorldView-2 (WV-2) satellite imagery, and to compare the commonly used pixel-based classification with object-oriented approaches. The results show that object-oriented approach is more suitable for classifying woody species, as well as other land cover classes when using high-resolution WV-2 imagery. The overall accuracy was 90% by object-based classification, while the pixel-based classification gave an overall accuracy of 78%. For *Melia*, a producer accuracy of 92% and user accuracy of 91% was obtained by object-oriented classification and a producer accuracy of 85% and user accuracy of 83% was obtained by pixel-based classification. Hence the combined use of new generation sensor imagery and the employment of object-oriented image

classification techniques provided more accurate information on *Melia* invasion in the study area. This is an encouraging result given the high degree of intermingling of *Melia* with other plants at the study site. In particular, the vegetation maps produced from this study would aid in gathering accurate knowledge about the distribution and spreading status of *Melia*, a major invasive species over large areas of South Africa and elsewhere in the world.

Keywords: Worldview-2; Image segmentation; Classification; *Melia azedarach*; Invasive trees