Integrated Multi-Sensor Observations for Australian Native Vegetation Condition Monitoring

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Mapping and monitoring the condition of Australia's native forests and woodlands is an important task, particularly on private land where fragmentation risk and resultant loss of biodiversity is great. Conflicting land use pressures on remnant vegetation requires careful management, which in turn relies on current and accurate information. Remote sensing provides opportunities to collect synoptic and repeatable data that can be used to support and improve environmental decision-making. The need for appropriate monitoring of Australian native vegetation condition has been recognised in the recently ratified Australian National Research Priorities. The National Parks and Wildlife Service of New South Wales and Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) are developing an operationally feasible remotely sensed toolkit for mapping vegetation condition. This paper presents an overview of a method for rapidly assessing the condition of native flora, using remotely sensed data, for pilot study areas within New South Wales. In situ observations of vegetation condition, at the patch scale, were made within the Little River catchment and Barmah forest region of New South Wales, Australia. These important habitats include the world's last significant river red gum (Eucalyptus camaldulensis) forests. Habitat variables were collected throughout 2001 and 2002, and included: degree of weed invasion, canopy dieback status, vegetation structure, coarse woody debris and erosion. These observations incorporate national benchmarks of biodiversity. Additionally ground based spectral observations were collected. These in situ observations were used to calibrate and validate both passive and active, remotely sensed data. Specifically, Landsat ETM, IKONOS, SPOT-4, ERS-2 SAR, LiDAR and EOS ASTER imagery were acquired over the study areas. Each sensing system was evaluated for its suitability of mapping vegetation condition in the context of biodiversity conservation. The methods used for combining data from a variety of platforms and sources are also presented with particular focus given to the analysis and management of relative positional accuracy issues between source datasets and derived image products. Preliminary results show integrating the spectral reflectance properties of the passive sensors with the structural information content offered using active system can provide suitable information for recovering vegetation characteristics relating to vegetation condition.