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Timothy J. Ralph  Editor
Abstracts

A comparative analysis of classification methods for burn scar mapping in wetlands

Mackenzie L.C. Austin, Hsing-Chung Chang, Kerrie M. Tomkins and Timothy J. Ralph

Department of Environmental Sciences, Macquarie University, NSW 2109, Australia. Email mackenzie.austin@hdr.mq.edu.au; michael.chang@mq.edu.au; kerrie.tomkins@mq.edu.au; tim.ralph@mq.edu.au

This project explores the role and history of fire in the Macquarie Marshes and Gwydir Wetlands in New South Wales with two key objectives; to compare the spectral indices and classification methods that can be utilised for burn scar mapping, and to understand the behaviour of vegetation regeneration and regrowth in post-fire wetland ecosystems, namely the rate of regeneration and its relation to variables influencing burn severity, such as wetland moisture content. The methodology consists of multiple stages, the first of which includes performing spectral indices such as the normalised vegetation differential index (NDVI) and NDVI-Difference, burned area index (BAI), and the leaf area index (LAI) using satellite imagery. These processes measure the red and near-infrared light reflected from a sensed surface, which can be used to calculate green vegetation cover and density, which will allow for the detection of the large vegetation losses caused by bushfires. These outputs will then be classified by different classification methods such as neural networks (NNs), support vector machines (SVM) and random forest (RF) to determine the accuracy of the delineation between ‘burned’ and ‘unburned’ pixels, with a comparative statistical analysis performed to ensure accurate results. Finally, these outputs will be sequenced to form a time-series analysis, highlighting vegetation regeneration over time.

Temporal change in the vegetation communities in the Macquarie Marshes, a wetland in the drylands of NSW

Sharon Bowen, Shannon Simpson, Darren Shelly and Tim Hosking

NSW Office of Environment and Heritage, NSW 2000, Australia. Email sharon.bowen@environment.nsw.gov.au

The vegetation communities of wetlands in drylands are comprised of species that require water from rivers (via flooding) to be available during some or all their lifecycle. Vegetation communities of wetlands in drylands are arranged in complex spatial patterns that can change over time. Water availability is the key driver of vegetation community structure and composition. We mapped the vegetation communities of the Macquarie Marshes at three times in the last three decades; 1991, 2008 and 2013. We investigated the change in spatial area of vegetation communities and compared the condition and extent of the communities at these three times. We found that there was a trajectory of change from better condition of communities in 1991 to displacement by terrestrialisation of wetland communities (2008), to a recovery of some areas of the Marshes through greater availability of water from natural flooding and managed environmental water delivery (2013).