Spatial models of the changes in the extent of native vegetation across Victoria: Fifteen years of landscape change from 1989 – 2005 - What have we lost, where did we lose it, and what does it matter?

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At the time of European settlement in the late 1700's and early 1800's, much of lowland South-eastern Australia was covered by woodlands and forests dominated by Eucalyptus, Acacia and Allocasuarina species. Large regions were also vegetated by 'grasslands' and 'grassy woodlands'. It was these landscapes that Major Mitchell identified as the 'Australia Felix', which lured graziers and 'squatters' from Europe to settle across South-Eastern Australia. Victoria currently retains approximately 1/3rd of it original native vegetation, and much of this has been lost from lowland areas that once supported these grassy ecosystems.

This paper details an approach to model the presence of woody vegetation (both trees and shrubs), and native grasslands – the latter are difficult to detect from remote-sensed data. 'Neural Networks' (a 'machine learning' statistical technique) were used to construct models of tree, shrub and grassland cover using a time series of Landsat imagery across South-Eastern Australia from 1989 to 2005. The large dataset (>200,000 model 'training points') led to the development of robust models for each vegetation type that could 'applied' across the whole study area at a 25m pixel resolution (B x 10x pixels). Model averaging was used to determine the mean, standard deviation, and upper and lower confidence intervals of the probability of each extant native vegetation type (tree, shrub, or native grassland) for each pixel. Two modelling epochs (1989 – 1995, and 1997 – 2005) were produced as mapped outputs and contrasted between the two time periods to provide statements of change over time. The locations and extent of these changes in native vegetation cover were then characterised by bioregion, land-use and cadastral data to analyse the relationships between land use change and the response of the indigenous vegetation.