

How the upgraded NSW woody vegetation extent for 2011 was created

The image data used

The source data was SPOT5 High Resolution Geometric (HRG) satellite imagery. It consists of 4 multispectral bands (10 m pixels), and a panchromatic band (2.5 m pixels). A time series of one image per year for the period 2008 to 2011 was acquired during dry periods where the contrast between woody vegetation and the ground cover is high. A total 1256 images were used. The images were registered with ground control. The multispectral imagery was corrected for atmospheric and bi-directional reflectance effects and sharpened to 5 m pixels using the panchromatic imagery. The images were masked for cloud, cloud shadow, topographic shadow, and water.

Detecting woody vegetation in the images

Woody foliage protective cover (FPC) is the fraction of the ground that is obscured by green leaf. An estimate of FPC was derived for every clear pixel in every image. This required a multiple linear regression model that related the multi-spectral reflectance to a reference data set of FPC. Each pixel contained up to 5 observations of FPC and reflectance over time.

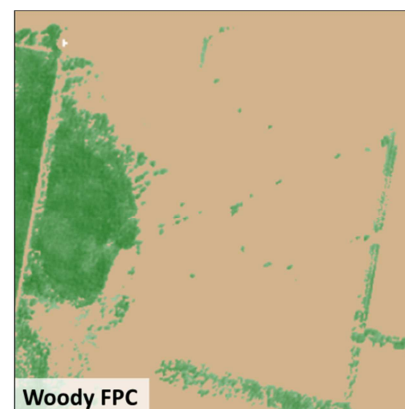
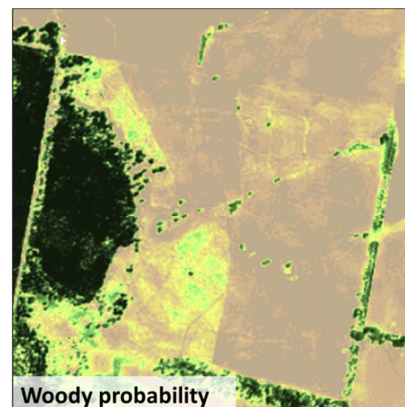
The probability of a pixel containing woody vegetation was determined using a binomial logistic regression model. The model parameters were the mean FPC, mean red reflectance, variation in FPC over time, and the climate variable vapour pressure deficit. The model was trained using 25930 observations of woody vegetation presence or absence. These points were interpreted from ADS40 aerial imagery where available (0.5 m pixels) and SPOT5 HRG panchromatic images (2.5 m pixels).

Mapping woody vegetation

Woody vegetation extent was mapped by applying a threshold to the probability images, with further editing by trained analysts. The mean FPC value over time was used to attribute each woody pixel. (See images to the right.)

Assessing the accuracy

Two comparisons with independently-derived datasets of woody-vegetation extent were performed. The first comparison used airborne Lidar collected across a range of vegetation formations, that had been related to data collected on the ground. 90.1% overall accuracy was obtained, although over half the errors were identified as being on the edges between woody and non-woody regions that may partly be caused by differences in positioning between the SPOT images and lidar data.



The range was from 85.3% in the Hunter to 94.5% in the South East. The second comparison used image-interpreted points of woody vegetation presence or absence. The overall accuracy was 88%, and the range was from 77.5% in Western NSW to 95.8% in the North Coast. Validation of the FPC values is forthcoming.

Acknowledgement

We owe a debt of gratitude to the numerous Science Division staff and volunteers who edited the maps. Thanks too, to the following organisations:

- Airbus Defence and Space for SPOT data
- NSW Land and Property Information for ADS40 data
- NSW Land and Property Information and a number of commercial vendors for Lidar data
- Staff from the Joint Remote Sensing Research Program.

Data access

The maps may be requested through the Office of Environment and Heritage's Spatial Data Online catalogue by searching *woody extent*:

<http://mapdata.environment.nsw.gov.au>.

Contact

Contact the data broker for data access and product information:

data.broker@environment.nsw.gov.au



We conducted field work to relate airborne and satellite data to what is on the ground. This photo was taken coincident with Lidar data capture in the Royal National Park south of Sydney.

References

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