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P4.104 | LandFor – Landsat for sustainable forest management

Project Leader Prof Simon Jones, Geospatial Sciences, RMIT; Dr Andrew Haywood, EU REDD Facility, EFI

Research Team Dr Mariela Soto-Berelov, RMIT; Sam Hislop, RMIT; Salahuddin Ahmad, DELWP; Trung Nguyen, RMIT

Project Participants Royal Melbourne Institute of Technology
Department of Environment, Land, Water, and Planning, Victoria; European Union REDD Facility, European Forest Institute

Objectives Use remote sensing to facilitate and "unlock" large area synoptic forest area monitoring and reporting to quantify annual impacts of land management, land use change and natural processes on forest lands.

Outcomes LandFor will produce a series of spatial datasets that will help inform land management needs and forest science. These include:

- State-wide maps of disturbance across Victoria's public forest estate according to agent of disturbance, magnitude of disturbance and year of disturbance (from the late 1980s until present)
- Exemplar extrapolation (and validation using a secondary data source) of forest inventory plot data such as biomass using the disturbance maps as input

Enhanced land management in Victoria using 25-years+ of satellite imagery

LandFor will develop critical components of Victoria's new strategic forest monitoring and forecasting framework. It will provide a robust, operational methodology to support transparent, accountable decision making in the forest land management and policy areas. Using Landsat time series imagery, disturbance datasets will be created to assist forest monitoring and reporting activities, and allow the annual impacts of land management, land use change and natural processes occurring on forest lands to be quantified.

Background

Victoria's forests on public land (7 M ha) are managed for wood production and the provision of non-wood production values (ecosystem services) including recreation, biological and landscape diversity. To sustainably manage and address monitoring and reporting activities, the Department of Environment, Land, Water, and Planning has established an extensive network of forest inventory plots across the state (Haywood et al., 2016).

Figure 1. Map of Victoria showing the Forest Inventory Plot Network (VFMP) across the public forest estate.

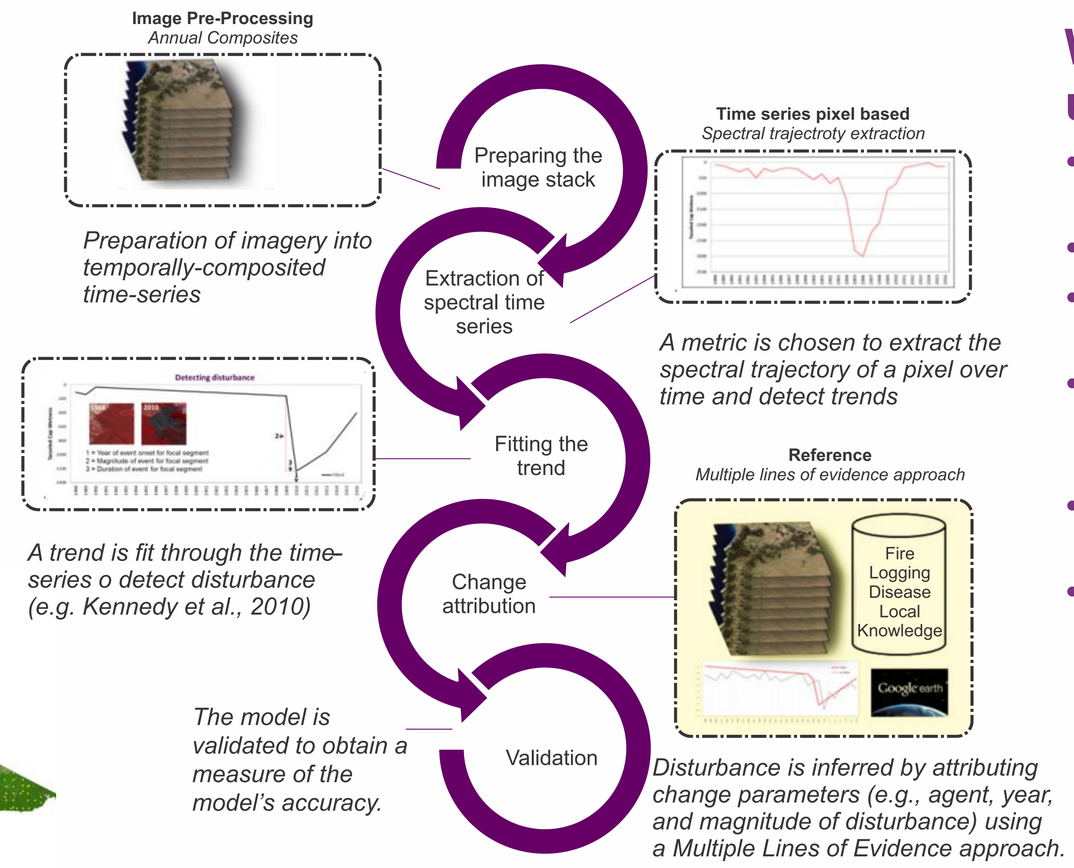
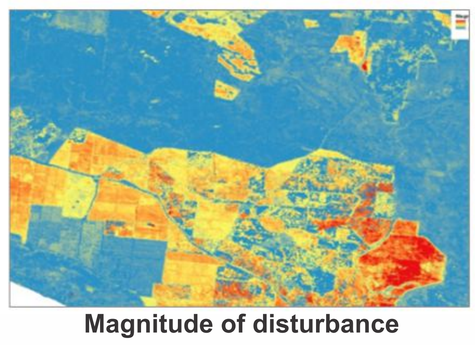


Figure 2. Conceptual frame work outlining the key steps followed during pixel based time series analysis.

What are LandFor outputs useful for?

- Support reporting and decision making in the land management and policy areas
- Understand the dynamic nature of an area
- Understand efficacy of land management interventions
- Quantify annual impacts of land management, LUCC, and natural processes occurring on forest lands
- Generate disturbance datasets that are needed for habitat/biodiversity mapping
- Dynamic way of visualizing changes.



Magnitude of disturbance

High
Low

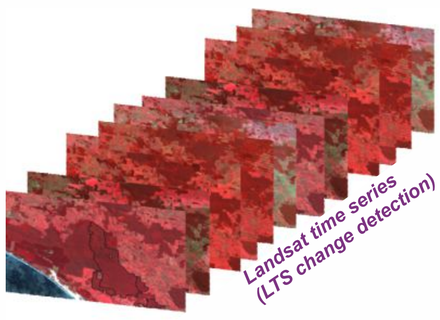
Disturbance interval

1990 - 1995
1996 - 2000
2001 - 2005
2006 - 2010
2011 - 2016

Aim

LandFor will develop critical components of Victoria's new strategic forest monitoring and forecasting framework by:

- Using remote sensing and Landsat time series change detection to increase the spatial and temporal representativeness of the plot network (<1% of the total forest area) through the creation of large area disturbance maps based on 25+ years satellite imagery



- Allowing the annual impacts of land management, land use change, and natural processes occurring on forest lands to be quantified.

Change attribution using a Multiple Lines of Evidence Approach

Time-series trajectories are interpreted using a multiple lines of evidence (MLE) approach to create disturbance layers with associated agents of change (such as fire, logging, disease, drought).

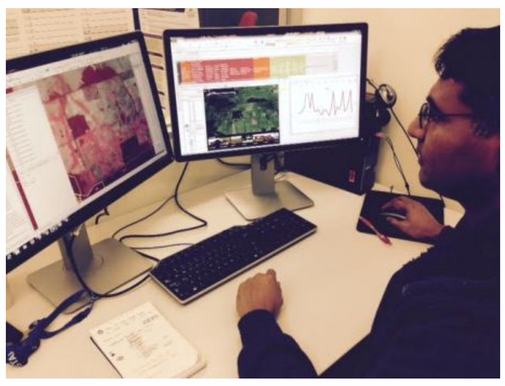


Figure 3. Human interpreter attributing disturbance using a MLE approach.

References:

Kennedy RE., Yang Z., Cohen WB. (2010) Detecting trends in forest disturbance and recovery using yearly Landsat time series: 1. LandTrendr — Temporal segmentation algorithms Remote Sensing of Environment 114, 2897–29105

Haywood A., Mellor A., Stone C., (2016) A strategic forest inventory for public land in Victoria, Australia, Forest Ecology and Management 367 (2016) 86–96.

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