



Australia's National Carbon Accounting System

A Case Study of *Spatially Explicit*
National Monitoring



National Carbon Accounting System

Aim: complete accounting and forecasting for human-induced sources and sinks from land-based systems ... an optimum response to the UNFCCC and its instruments.

- The Australian Government has invested approximately \$4M AUD per year since 1998 to develop a National Carbon Accounting System.





Key issues from the ‘Aim’

- *Complete* – all lands, carbon pools gases and activities at all scales
- *Accounting and forecasting* – retrospective and predictive
- *UNFCCC and instruments* – designed specifically for this purpose





Key design decisions

- Spatially explicit, through time-series remote sensing (wall-to-wall)
- Underpinned by a single ‘process’, mass balance, full cycle, C:N, ecosystems model
- Integrated – one model application only for all purposes and scales
- Progressive ‘build’ by policy priority – over several 4 year phases – deforestation 1st





Key features of implementation

- Informs and monitors policy formulation and implementation, does not attempt to ‘make’ policy
- Transparent - publication and availability of data, tools and results
- Scientifically validated – QA, QC, CIVP and peer review
- A research adopter, not researcher
- Outsourced – private sector, institutions, governments
- Any secondary benefits not to compromise primary goals





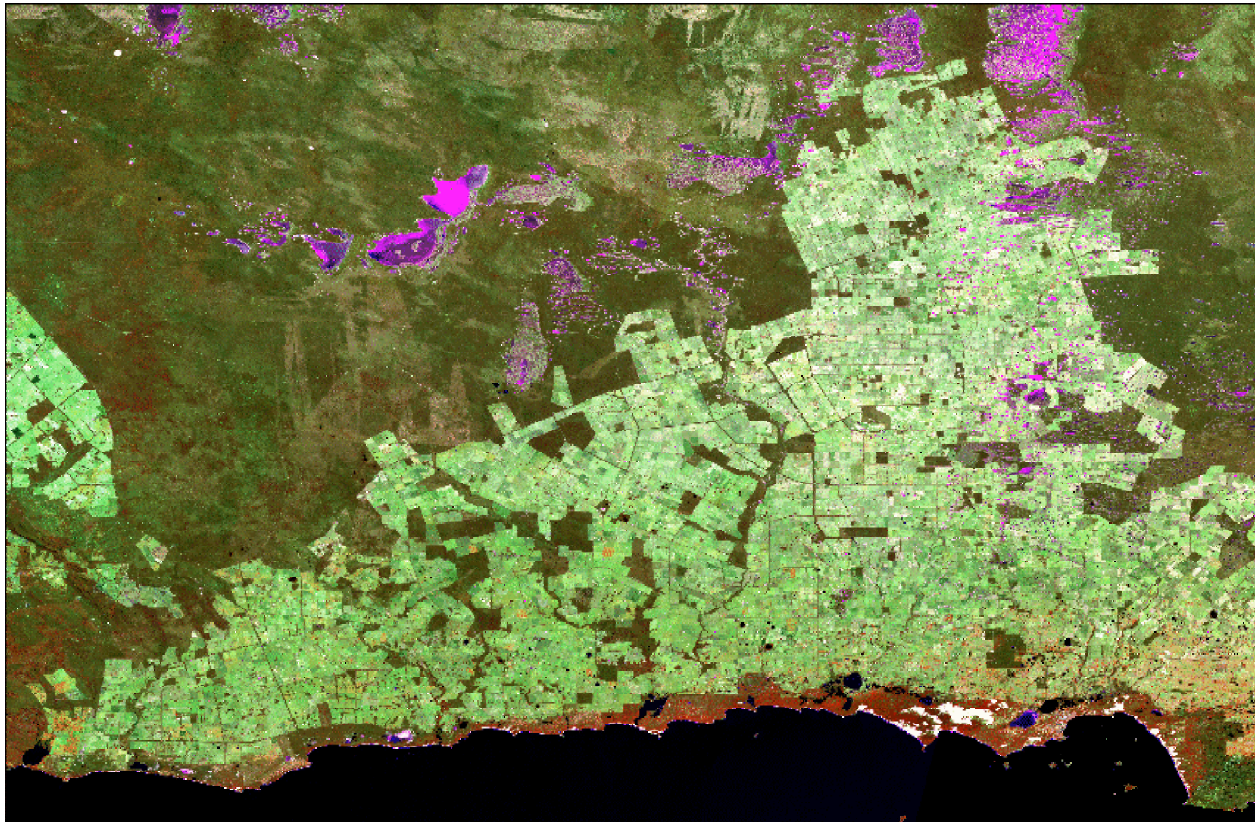
Land Representation

- Land cover change (wall-to-wall national time series of remote sensing at 25m)
- Bio-physical inventory mapping, e.g., soil
- Climate – surfaces developed from weather station data
- Land use and management from remote sensing and survey



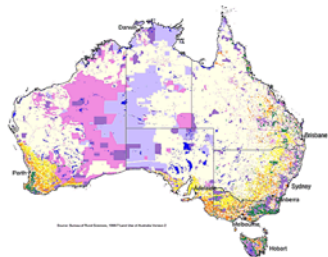


Deforestation over time



Deforestation
over 30 years
in 14
'snapshots'
for an area of
about 20
million
hectares

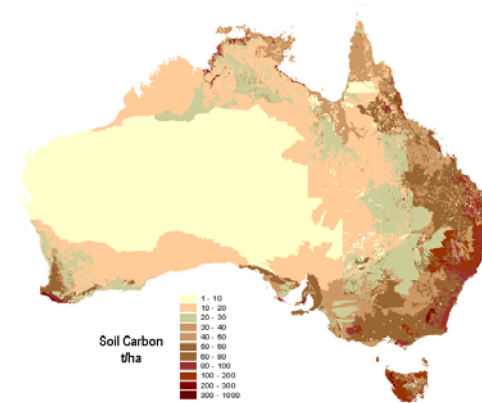




Land use

- No data
- Nature conservation (1.1)
- Other protected areas including Indigenous uses (1.2)
- Other minimal use (1.3)
- Grazing natural vegetation (2.1)
- Production forestry (2.1, 4.1)
- Grazing modified pastures (3.2)
- Cultivated cropping (3.3)
- Other horticulture (3.4, 3.5)
- Integrat@pasture and cropping (4.2, 4.3)
- Integrat@horticulture (4.4, 4.5)
- Urban intensive uses (5.4, 5.4.1, 5.5, 5.6, 5.7)
- Water (5.8)

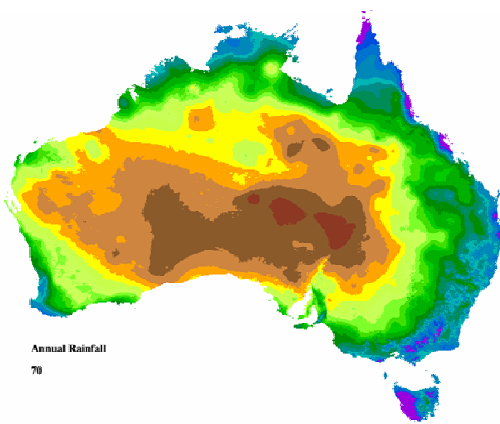
Land use



Soil Carbon

- 1-10
- 10-20
- 20-30
- 30-40
- 40-50
- 50-60
- 60-80
- 80-100
- 100-200
- 200-300
- 300-1000

Soil

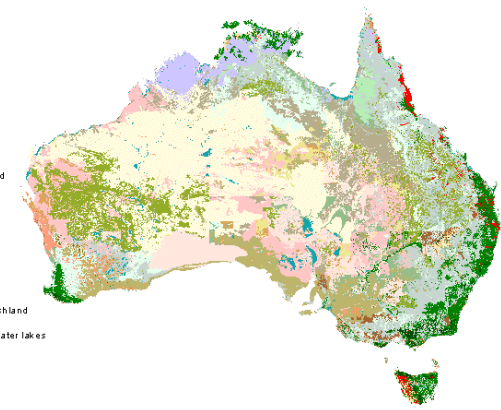


Annual Rainfall

70

- 0mm
- 50mm
- 100mm
- 150mm
- 200mm
- 250mm
- 300mm
- 350mm
- 400mm
- 450mm
- 500mm
- 600mm
- 700mm
- 800mm
- 900mm
- 1000mm
- 1250mm
- 1500mm
- 1750mm

Climate



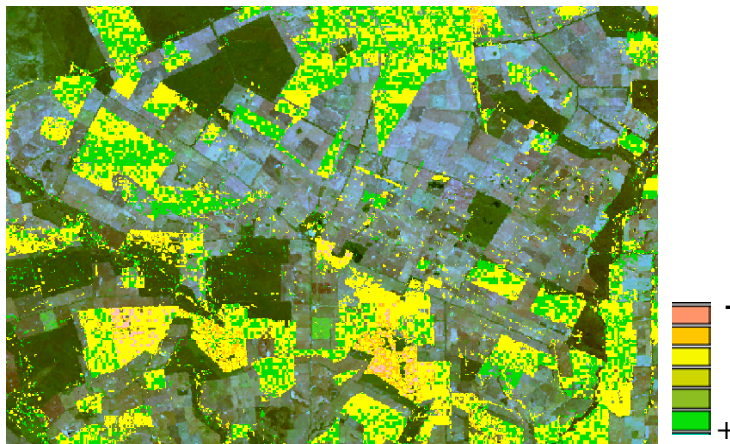
- Rainforest & Vine Thickets
- Eucalyptus Tall Open Forest
- Eucalyptus Open & Low Open Forest
- Eucalyptus Woodland
- Acacia Forest & Woodland
- Melaleuca Forest & Woodland
- Callitris, Casuarina & Other Forest & Woodland
- Eucalyptus Open Woodland
- Tropical Eucalypt Woodland/Grassland
- Acacia Open Woodland
- Mallee Woodland & Shrubland
- Low Closed Forest & Closed Shrubland
- Acacia Shrublands
- Other Shrublands
- Heath
- Tussock Grassland
- Hummock Grassland
- Other Grasslands, Hermland, Sedgeland & Rushland
- Chenopod Shrub, Samphire Shrub & Forbland
- Mangrove, samphire, sand, rock, salt & freshwater lakes
- Grazing on Native Pastures
- Agricultural / Urban
- Cleared (primarily agricultural land)
- No data

Vegetation

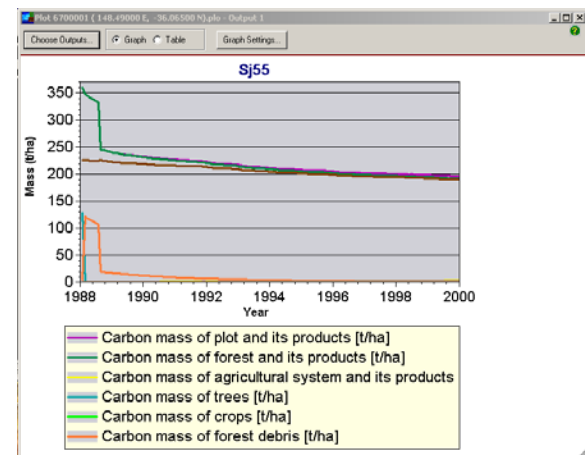


Emissions estimation

- Spatial by grid analysis using model
- Project by wizard to project results



Across a landscape/country



For a project



Benefits

- a single system reconciles ‘project’ and ‘national’ accounts
- removes potential for sampling uncertainty in monitoring of land use change
- predictive and spatially explicit to assess possible consequence of particular actions
- transparent and verifiable at all scales





Wider Implementation

- Aust. has a large land area and relatively small population – remote sensing is a cost effective solution
- Monitoring has become easier with new technologies and instruments
- Costs are reducing – for Aust. ~\$750,000 per national update
- National time-series monitoring is widely achievable



