Knowledge Exchange on Ecosystem Accounting 2015

Presented by: John Power, ABS
Date: 24 February, 2015

Land and ecosystem accounting

Presentation Overview

- Why land accounting?
- Scope and definitions of land accounting (SEEA Experimental Ecosystem Accounting)
- Spatial units
- Data sources and methodology
  - Classifications
  - Data Sources
  - Tables
- Uses of land accounts
- Lessons learned

Why land accounting?

Links the SEEA Central Framework to the SEEA Experimental Ecosystem Accounting

The starting point for most assessments of ecosystem services

Fundamental to economic production

A major proportion of most nations' total assets

Using land effects the condition and capacity of ecosystems

Why land accounting?

Which of the following statements is true?

A. Land cover mapping provides the starting point for most assessments of ecosystem services

B. Land represents a major proportion of most nations' total assets and is fundamental to economic production

C. The way we use land affects the condition and capacity of ecosystems

D. Land accounting links the SEEA Central Framework to the SEEA Experimental Ecosystem Accounting

Definitions of land

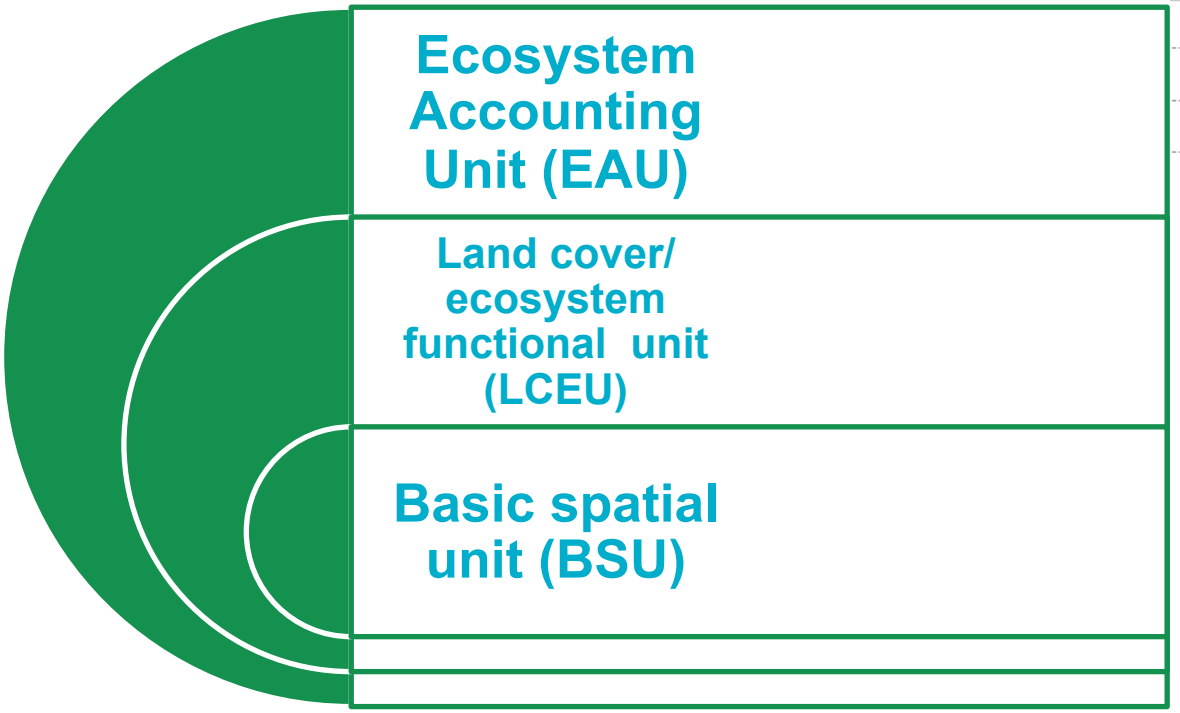
SEEA Sec. 6.5.2 Definition and classification of land

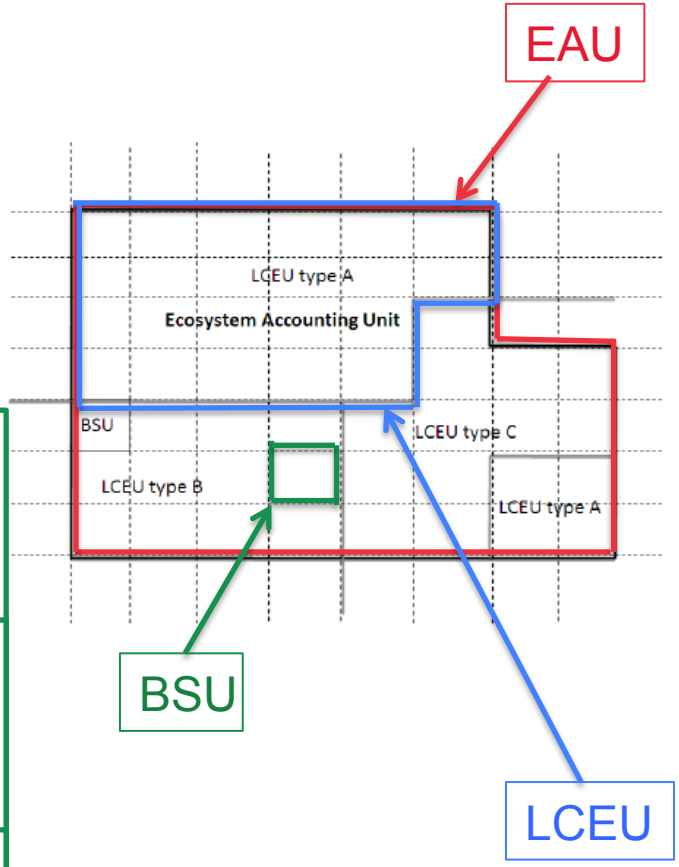
Land use – reflects both (i) the activities undertaken and (ii) the institutional arrangements put in place on the land

Land cover – refers to the observed physical and biological cover of the Earth's surface

Land ownership – by industry (e.g. agriculture, mining) or by sector (e.g. public or private)

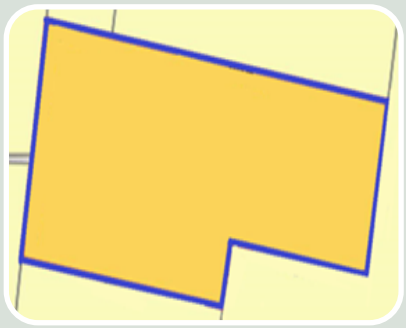
Spatial units in the SEEA-EEA





Basic spatial unit (or ‘BSU’)

Can be more than just cells in a grid



Land parcels: Areas of land defined by land ownership as identified in land title registers.

Gridded data:

A raster grid consists of a matrix of cells where each cell contains a value representing information

Point data:

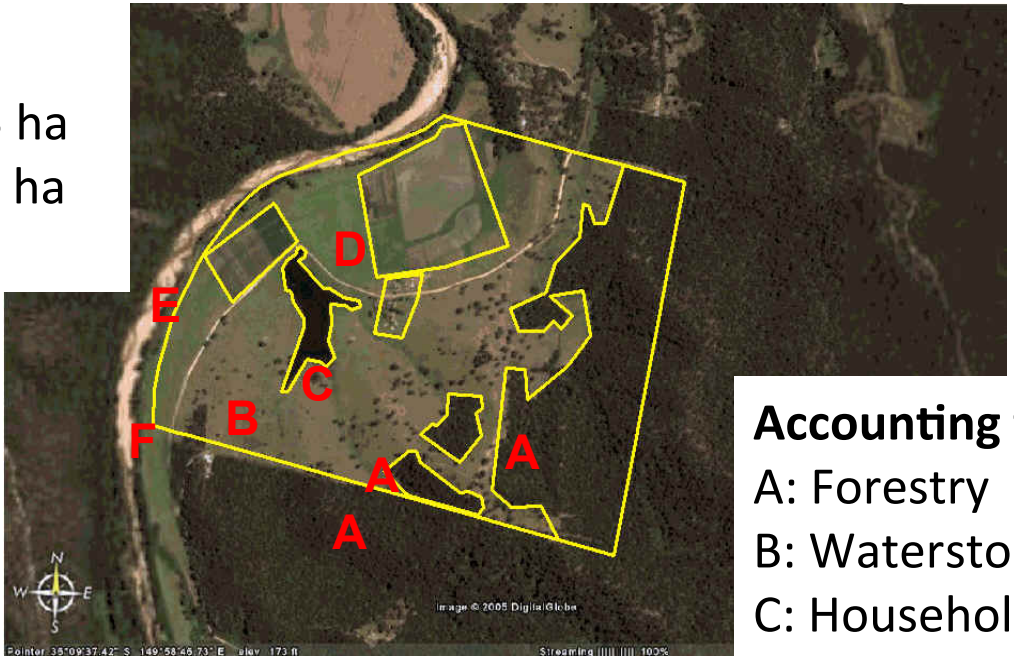
Data attributed to a particular point (e.g. via coordinates of latitude and longitude)

Accounting for land cover and land use in a land parcel

Accounting for land cover

A: Forest 39.0 ha
B: Water 3.5 ha
C: Residence 1.8 ha
D: Irrigated crop 13.5 ha
E: Other crop 3.8 ha
F: Grassland 68.0 ha

Total area 129.5 ha



Accounting for land use

A: Forestry ?39.0 ha
B: Waterstorage 3.5 ha
C: Household 1.8 ha
D: Agriculture 13.5 ha
E: Agriculture 3.8 ha
F: Agriculture 68.0 ha

Is a land parcel a basic spatial unit?

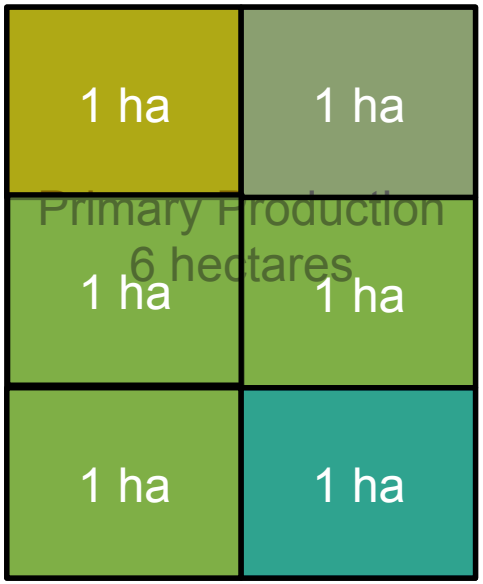
Net change in land cover

Land use	Opening stock	Built Up Surface	Irrigated Cropping	Trees	Inland Waterbodies	Total Net Change	Closing Stock
Built Up Surface	1						1
Irrigated Cropping	1			3		3	4
Trees	3		-3			-3	0
Inland Waterbodies	1						1

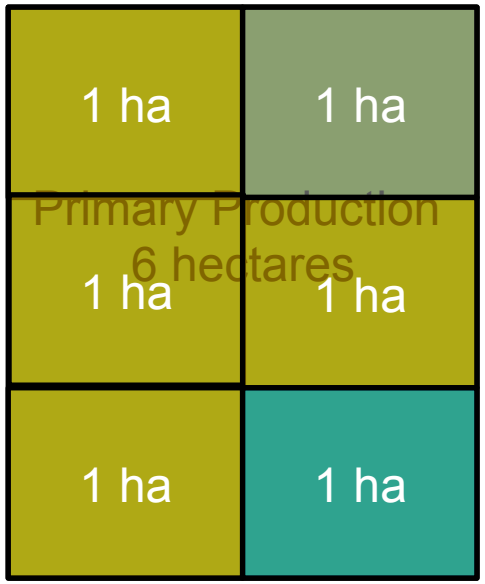
Built Up Surface Irrigated Cropping Trees Inland Waterbodies

Land use by land cover – time series

Property/Grid A 2006



Property/Grid A 2011



Land use by cover	2006	2011
Prim Prod / Built Up	1	1
Prim Prod / Irrigated	1	4
Prim Prod / Trees	3	0
Prim Prod / Inland W	1	1

Built Up Surface Irrigated Cropping Trees Inland Waterbodies

What do land accounting tables look like?

E.g. Land use net change matrix for Great Barrier Reef region

Australian Bureau of Statistics

4609055001DO004_201306 Land Account: Great Barrier Reef Region, Experimental Estimates, 2014

Released at 11:30 am (Canberra time) Fri 18 July 2014

Table 4.6 : Land use net change matrix 2009 to 2013, GBR Region Total (Hectares), 2014

Livestock Grazing

		Land use (Hectares)												
Land use	Opening Stock 2009	Residential	Commercial	Industrial	Industry and Infrastructure/Utilities	Agriculture Cropping	Livestock Grazing	Other Primary Production	Community Services, Sport, Heritage and Culture	National Parks, conservation areas, forest reserves and natural water	Unallocated (a)	Not Classified (b)	Total Net Change	Closing Stock 2013
Residential	63,400	0	0	300	0	1,300	3,400	100	0	0	3,100	100	8,200	71,500
Commercial	39,900	0	0	0	4,200	-200	-3,800		-100	-200	100		500	40,500
Industrial	48,500	-300	0	0	-4,500	1,800	-1,300	-100	-200	0	400	-300	-4,500	44,000
Extractive Industry and Infrastructure/Utilities	390,900	0	-4,200	4,500	0		78,400	-100		7,200	12,900	-7,400	115,100	506,000
Agriculture Cropping	[illegible]	-1,300	200	-1,800				-11,200		-700	-6,700	-71,200	[illegible]	1,811,200
Livestock Grazing	29,590,100	-3,400	3,800	1,300	-78,400	25,200	0	25,700			131,100	331,300	[illegible]	30,018,800
Other Primary Production	458,200	-100		100	100	11,200	-25,700	0		22,600	-4,500	-12,100	-8,200	449,900
Community Services, Sport, Heritage and	84,500	0	100	200				0	0	5,400	200			69,600
National Parks, conservation areas, forest reserves and natural water	1,165,100	0	200	0	-7,200			-22,600	-5,400	0	-37,200			1,154,600
Unallocated (a)	2,353,300	-3,100	-100	-400	-12,900	6,700	-131,100	4,500	-200	37,200	0	23,800	-75,700	2,277,700
Not Classified (b)	2,343,600	-100	-600	300	7,400	71,200	-331,300	12,100	0	-14,100	-23,800	0	-279,000	2,064,600

390,000

78,400

115,100

(a) This includes land uses that could not be allocated to AVPCC.

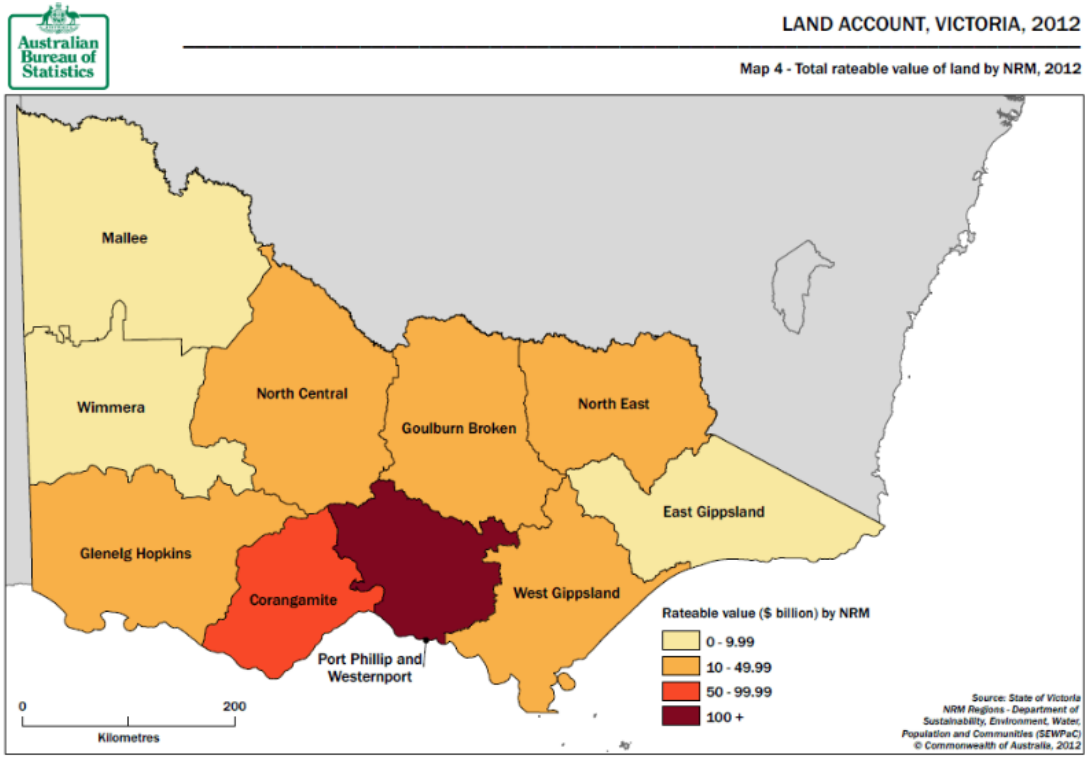
(b) No land use information available.

Note: Sums may not necessarily equal totals due to rounding. All values have been rounded to the nearest hundred (hectares).

Example output: map of rateable value by Natural Resource Management Region

Natural Resource Management regions are an example of Ecosystem Accounting Unit (EAU)

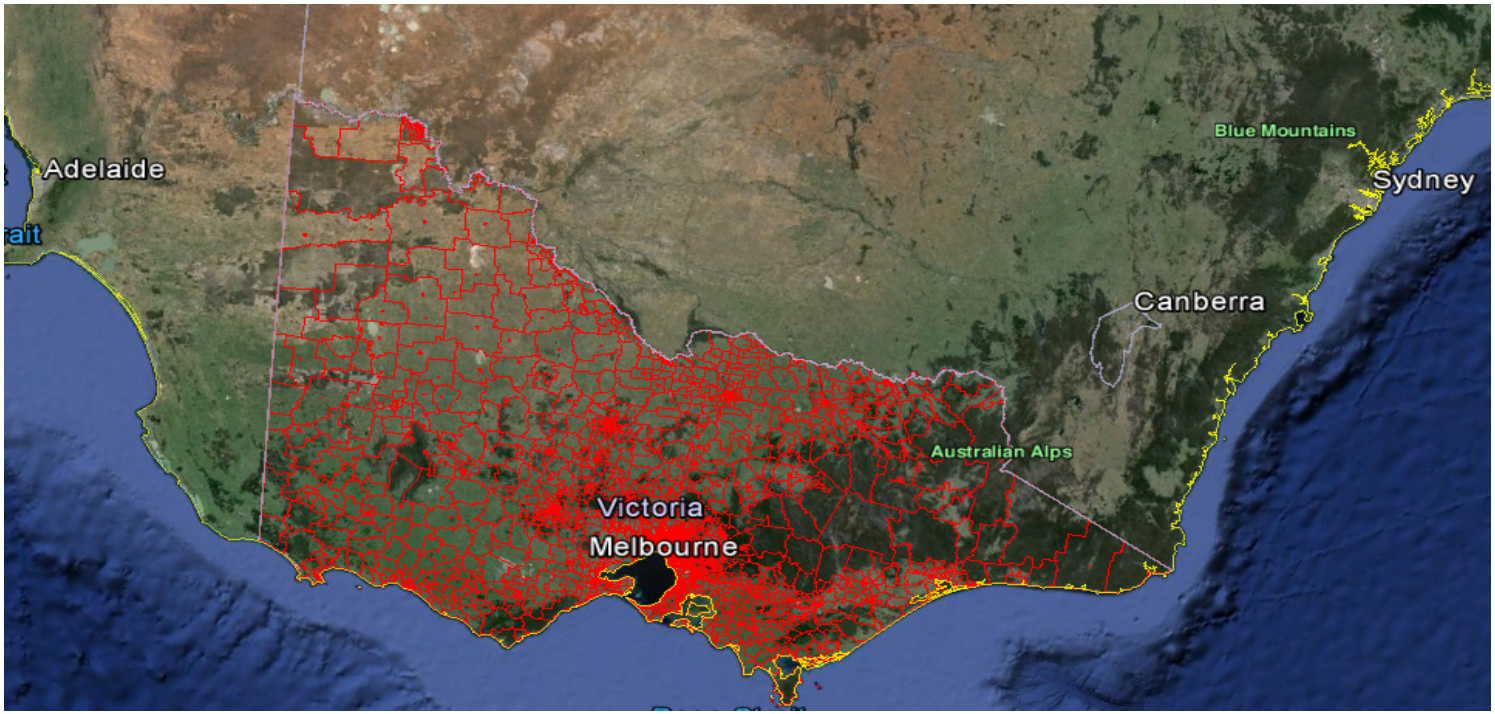
What management areas (or EAUs) would be appropriate for your country or organisation?



Example output

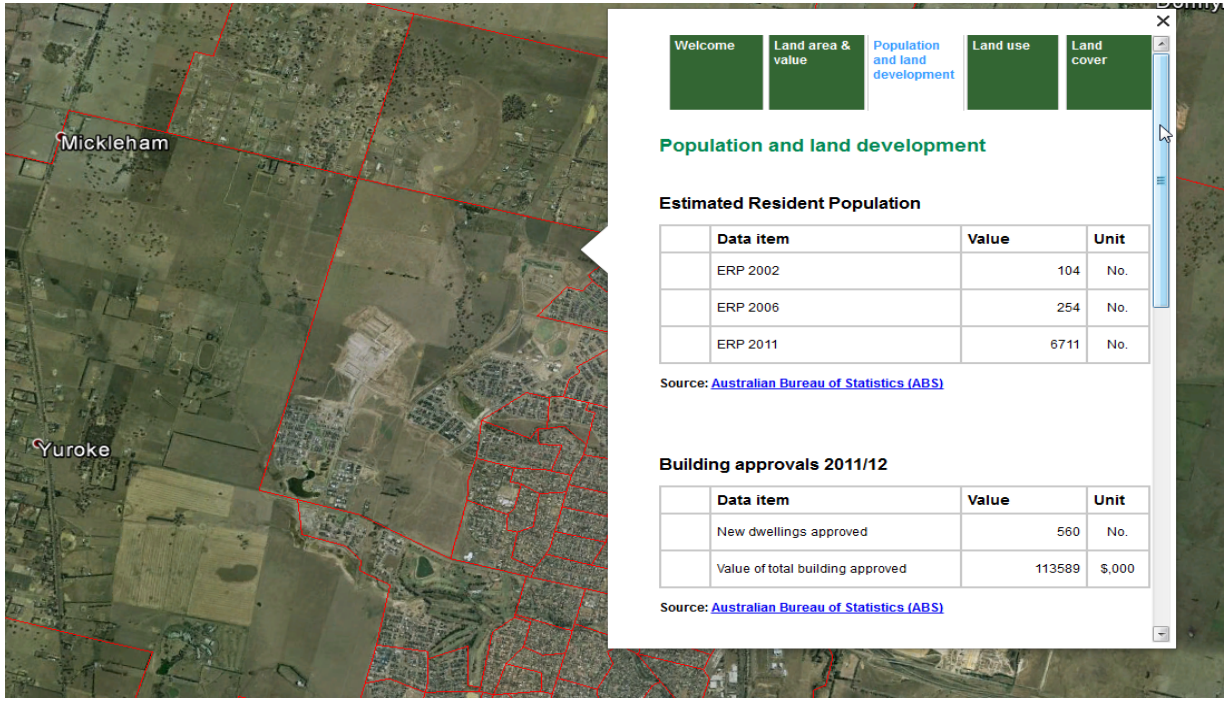
Mapping data in Google Earth

- **13,355 regions across the state of Victoria**



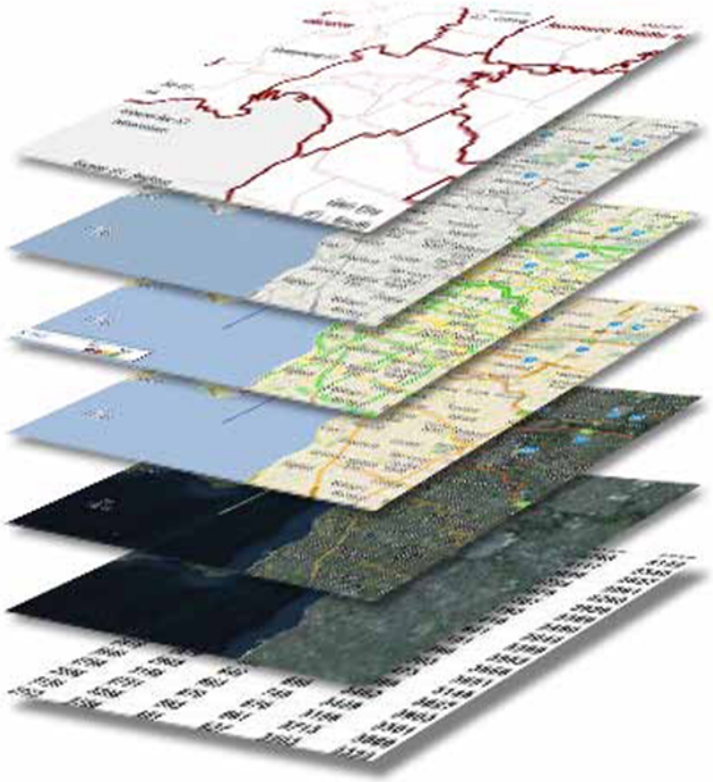
Example output: data linked to Google Earth

- **Summary data is provided for each statistical area (SA1)**



Is a statistical area a basic spatial unit, a land cover ecosystem functional unit or ecosystem accounting unit?

How do you produce a Land Account?



- **Integrate existing environmental and economic information at the finest level possible.**
- **Use GIS technology to integrate**
- **Presenting results at various geographic levels.**
- **Present results for at least two time periods**

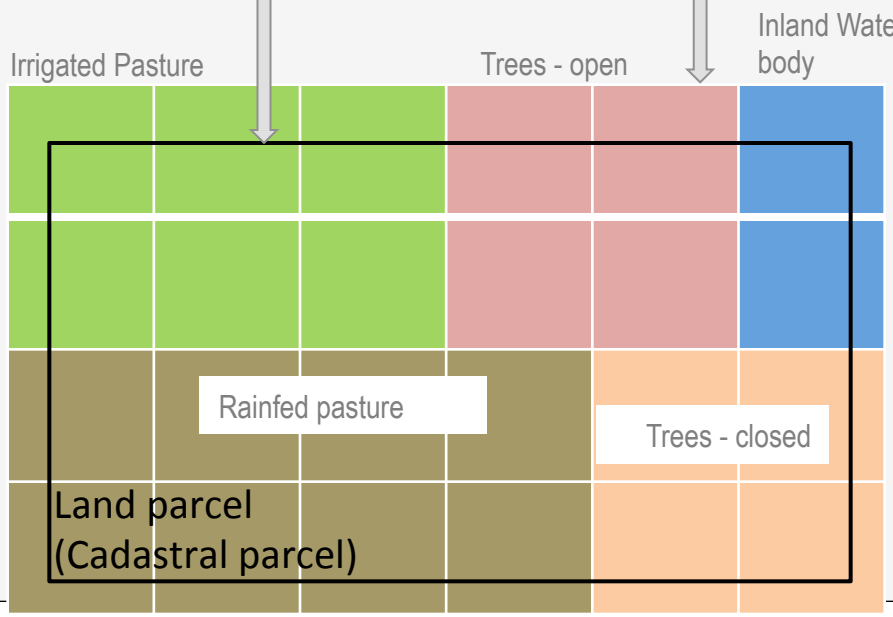
The Method in Australia

Integrating at the property level (basic spatial unit)

Input

State Valuations data for properties (cadastre):
- Land Use
- Land value

Geoscience Australia's Dynamic Land Cover gridded data

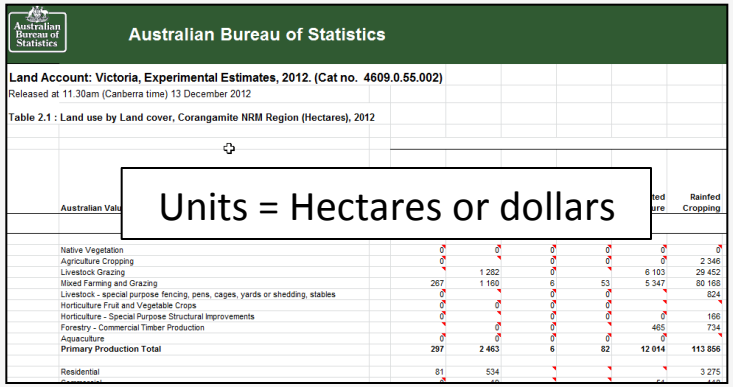


Output

Primary Land Account tables – NRM and State

Land Cover

Land Use


Australian Bureau of Statistics

Land Account: Victoria, Experimental Estimates, 2012. (Cat no. 4609.0.55.002)

Released at 11.30am (Canberra time) 13 December 2012

Table 2.1 : Land use by Land cover, Corangamite NRM Region (Hectares), 2012

Units = Hectares or dollars

Native Vegetation						
Agriculture Cropping						2 346
Livestock Grazing		1 282			6 103	29 452
Mixed Farming and Grazing	267	1 160	6	53	5 347	80 168
Livestock - special purpose fencing, pens, cages, yards or shedding, stables						824
Horticulture Fruit and Vegetable Crops						
Horticulture - Special Purpose Structural Improvements						166
Forestry - Commercial Timber Production					465	734
Aquaculture						
Primary Production Total	**297**	**2 463**	**6**	**82**	**12 014**	**113 856**
Residential	81	534				3 275

Statistical Area Level 1 summary data with additional information
- Land value
- Land cover
- Land use
- Population
- Building approvals
- Cadastral change

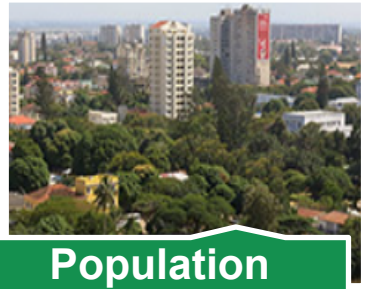
Possible issues with data

What other issues have you experienced?

- Different reference periods ("currency") for data sources
- Multiple classifications used
- Linking economic units does not geocode accurately to cadastral parcel.
- Data inaccuracy – e.g. cadastral boundaries shift over time
- Multiple land uses allocated to the same property

Uses of Land Accounting

Informing debate on:



Population settlement

Agricultural productivity

Health of the environment

Costs and benefits of economic activities

Investment environmental protection, e.g. biodiversity conservation

What uses can you see?

Lessons learnt

- Many data sources – Takes time locate and understand
- Conflicting data sources - For land use and land cover
- Data Quality – Variable between datasets, particularly for measuring change
- Confidentiality – Fine levels of geographic presentation posses challenges
- Consistency – Remain comparable to national accounts

Have you experienced any of these problems?

Further information

ABS Publications

4609.0.55.001 - Land Account: Great Barrier Reef Region, Experimental Estimates, 2011

4609.0.55.002 - Land Account: Victoria, Experimental Estimates, 2012

4609.0.55.003 - Land Account: Queensland, Experimental Estimates, 2013

4609.0.55.001 - Land Account: Great Barrier Reef Region, Experimental Estimates, 2014

ABS Contact

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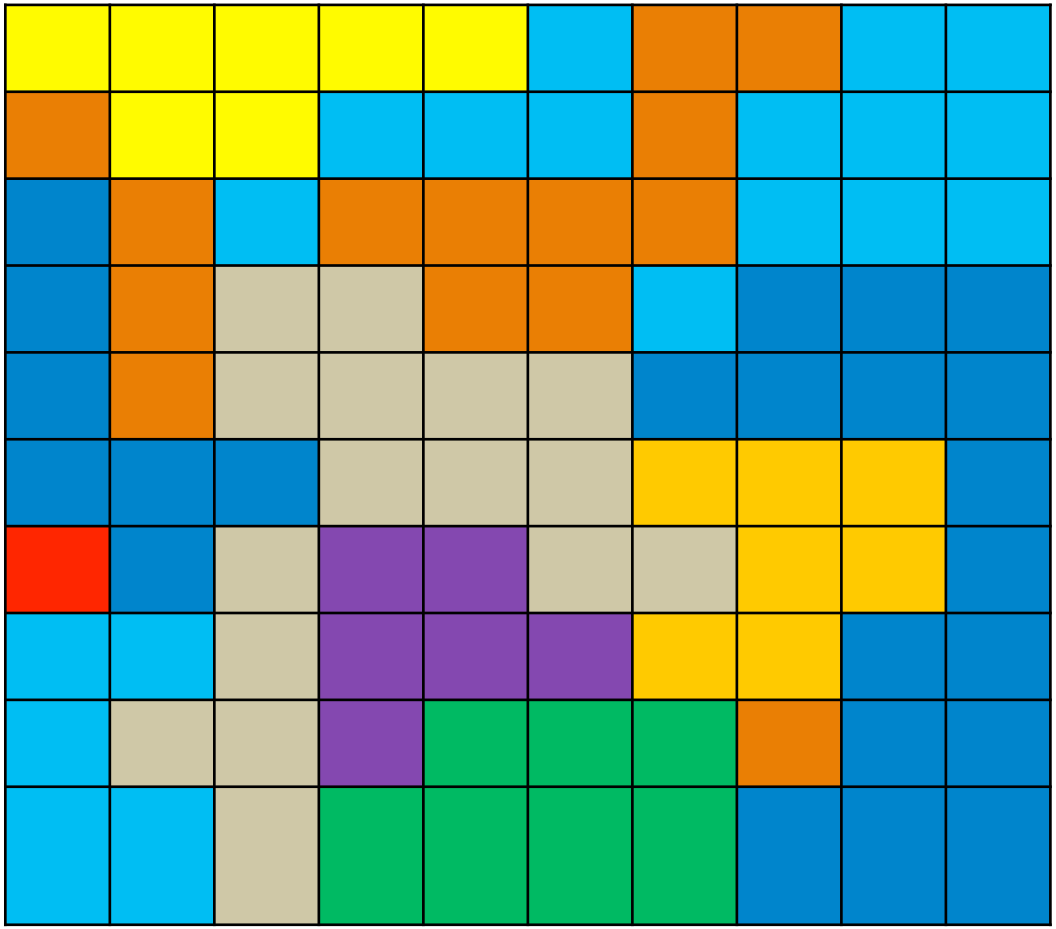
Exercise: Handout provided

Completing a land cover change matrix

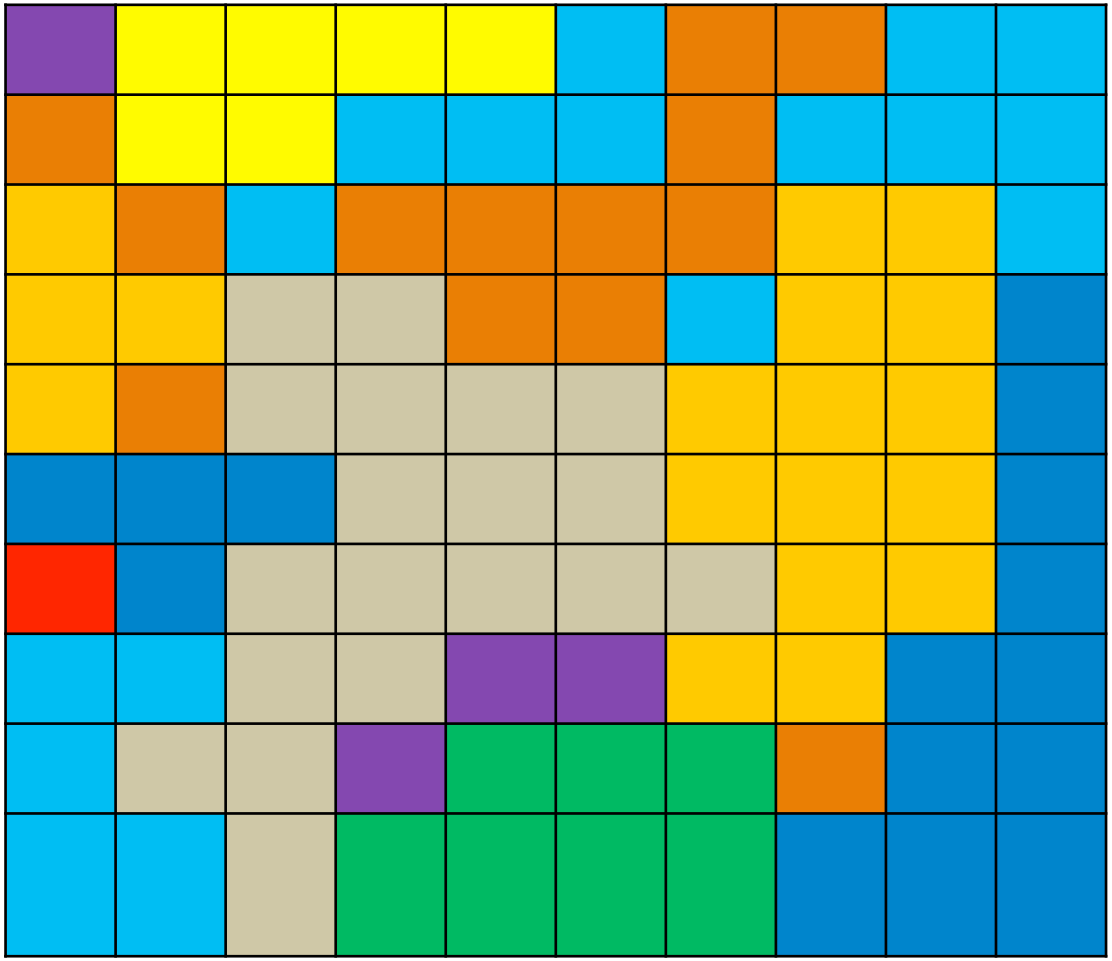
Land cover	Opening area, time 1	Net increases (positive numbers) and decreases (negative numbers) from other land covers, time 1 to time 2 (1,000 ha)										Net change (increase – decreases)	Closing area, time 2
		Artificial surfaces	Crops	Grassland	Tree covered area	Mangroves	Shrub covered area	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow, glaciers and inland water bodies	Coastal water and inter-tidal areas	
Artificial surfaces													
Crops													
Grassland													
Tree covered area													
Mangroves													
Shrub covered area													
Regularly flooded areas													
Sparse natural vegetated areas													
Terrestrial barren land													
Permanent snow, glaciers and inland water bodies													
Coastal water and inter-tidal areas													

Stylized land cover map – Time 1 (e.g. 2000)



Artificial surfaces
Crops (a)
Grassland
Tree covered area
Mangroves
Shrub covered area
Regularly flooded areas
Sparse natural vegetated areas
Terrestrial barren land
Permanent snow, glaciers and inland water bodies

Stylized land cover map – Time 2 (e.g. 2010)



Artificial surfaces
Crops (a)
Grassland
Tree covered area
Mangroves
Shrub covered area
Regularly flooded areas
Sparse natural vegetated areas
Terrestrial barren land
Permanent snow, glaciers and inland water bodies

Session feedback

Please rate the session on a scale of 1 to 5

1. **Very poor,**
2. **Poor,**
3. **Average,**
4. **Good,**
5. **Very good**