From Land to Ecosystem accounting
This session...

• Overview of land account construction, how it relates to Ecosystem accounting
• Shared methods, quality aspects
• Issues for consideration
Land Accounts

• Cover
• Use
• Value
• Utilisation and limitations
• Key linking tool – EA to Ecosystem, social, etc.
Land Account visualisation

Property layer intersected with Dynamic Land Cover in ArcGIS
Land Account visualisation

Cadastre

Property Area
10 Hectares

Valuation data

Agriculture ($)

Site Value = $250,000

Land cover

10% Built up Surface
25% Trees
65% Irrigated Cropping

Figure 1. Land use by cover (rateable value)

<table>
<thead>
<tr>
<th>Dynamic Land Cover</th>
<th>AVPCC</th>
<th>Irrigated Cropping</th>
<th>Built-up surface</th>
<th>Trees</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>162,500.00</td>
<td>25,000.00</td>
<td>62,500.00</td>
<td>250,000.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>162,500.00</td>
<td>25,000.00</td>
<td>62,500.00</td>
<td>250,000.00</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Land use by cover (hectares)

<table>
<thead>
<tr>
<th>Dynamic Land Cover</th>
<th>AVPCC</th>
<th>Irrigated Cropping</th>
<th>Built-up surface</th>
<th>Trees</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>6.5</td>
<td>1</td>
<td>2.5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6.5</td>
<td>1</td>
<td>2.5</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Land Account visualisation

**Input**
- State Valuations data for properties:
  - Land Use
  - Land value
- Geoscience Australia’s Dynamic Land Cover gridded data

**Output**
- Primary Land Account tables
- NRM and State

**Land Cover**
- Units = Hectares or dollars

**Statistical Area Level 1 summary data with additional information**
- Land value
- Land use
- Building approvals
- Land cover
- Population
- Cadastral change
2. Rateable value and Land use

2.1 Land use and rateable land value

<table>
<thead>
<tr>
<th>Data item</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of this SA1 region</td>
<td>70.9</td>
<td>Ha</td>
</tr>
<tr>
<td>Rateable Value</td>
<td>19.9</td>
<td>$m</td>
</tr>
<tr>
<td>Agriculture</td>
<td>-</td>
<td>%</td>
</tr>
<tr>
<td>Retail/Wholesale</td>
<td>1.6</td>
<td>%</td>
</tr>
<tr>
<td>Transport Storage</td>
<td>-</td>
<td>%</td>
</tr>
<tr>
<td>Industrial</td>
<td>8.2</td>
<td>%</td>
</tr>
<tr>
<td>Sport, Recreation, Accommodation</td>
<td>0.8</td>
<td>%</td>
</tr>
<tr>
<td>Community Services</td>
<td>4.7</td>
<td>%</td>
</tr>
<tr>
<td>Residential</td>
<td>37.5</td>
<td>%</td>
</tr>
<tr>
<td>Vacant Land - Urban</td>
<td>9.4</td>
<td>%</td>
</tr>
<tr>
<td>Vacant Land - Rural</td>
<td>0.1</td>
<td>%</td>
</tr>
</tbody>
</table>

Source: ABS
Ecosystem asset account

- Ecosystems, Habitats, Land covers
- Extent
- Condition
- Not limited to land
Services – What can land accounting tell us?

- Carbon storage by land cover type and change – Olsen, etc
- Cultural services by land use – Parkland among built-up areas, National Parks.
- Land use indicator
Accounting for land cover and land use

**Accounting for land cover (by vegetation type)**

- 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 ecosystem condition**

1. Simple extent of native vegetation relative to “natural” = 21%
2. Other possible physical measures of assets – soil, native species, structure of remaining native vegetation, water quality, etc.
3. Flow of services – production of food, wood and water

**Accounting for land use (by industry/sector)**

- A: Forestry 39.0 ha
- B: Water storage 3.5 ha
- C: Household 1.8 ha
- D: Agriculture 13.5 ha
- E: Agriculture 3.8 ha
- F: Agriculture 68.0 ha
Accounting for ecosystem services and inter and intra ecosystem flows

Accounting for ecosystem services (by CICES)
Provisioning
  - Timber
  - Water
  - Food

Regulating
Cultural /recreational

Ecosystem services
Imports, e.g.
- Water from river to farm dam and to irrigate crops
- Farmer walks dog in adjacent forest

Exports, e.g.
- Crops and livestock
- Timber

Inter-ecosystem flows, e.g.
- Water from farm to river (outflow, i.e. run-off)
- Water filtration service (outflow)
- Crop pollination service from insects resident in adjacent forest (inflow)

Intra-ecosystem flows, e.g.
- Nutrient cycling within forest on farm
- Transpiration of water by forest plants
Shared data and infrastructure

- Land cover classifications
- Units
- Extent
- Condition (large scale – extent cv. 1750)
- Data sources

![Graph showing percentage of 1750 native vegetation remaining in 2006 by NRM region.]
Shared data methods

- Integrating existing enviro-economic information at the property level where possible.
- Geospatial analysis - using GIS technology to integrate
- Presenting results at various geographic levels.
- Repeating to measure change.
Issues for Consideration – Measurement and scale

- Extent –
- Land Accounts
- Remote Sensing characteristics
  - MODIS
  - LANDSAT
  - Cadastre vs raster
Issues for Consideration – Measurement and scale

Condition –

• Scale effects
• Valuation change - Condition defined by the ability to produce services?
• Agreed upon indicators of key characteristics?
• Trade offs
Quality aspects

• Consistent, timely
• Users cyclical?
• Science Vs Other disciplines “Right”
Summary

- Land accounting a springboard to ecosystem accounting.
- Crucial spatial lens
- Units are key to both accounts
Questions?
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