Progress, challenges and opportunities for biodiversity accounting
Outline

• Progress
  • Work by a range of countries and organisations
• Accounting for the Central Highlands of Victoria Australia
• Challenges
• Opportunities
Progress

• Paper by UNEP-WCMC
• Biodiversity included in several accounts or studies (E.g. Australia, Netherlands, Mauritius, UK)
• Engagement with the “biodiversity community”
  • Still some confusion in terminology and concepts
  • A better understanding of concepts to measured
Terminology and concepts

In CBD definition (very broad)

• Ecosystem *diversity* a subset of biological *diversity*

In SEEA-EEA

• Biodiversity *accounting* a subset of ecosystem *accounting*

• Ecosystems are the interactions within and between the living (=biodiversity) and non-living components (landform, water, carbon, nutrients, etc.)

Need more precision in discussions
Key species level metrics

(After Pereira et al. 2013, Tittensor et al. 2014)

• Species diversity or richness (i.e. total number of species in a particular area or region);
• Species abundance (i.e. the number of individuals of each species);
• Species distribution (i.e. the area over which a particular species occurs);
• Species traits, including reproductive rates (the rate at which a species grows in abundance);
• Species status (or extinction risk)(e.g. McCarthy et al. 2014)
Measurement of biodiversity

<table>
<thead>
<tr>
<th></th>
<th>Level of diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Genetic-level biodiversity</td>
</tr>
<tr>
<td>Composition</td>
<td>Gene</td>
</tr>
<tr>
<td></td>
<td>Species richness</td>
</tr>
<tr>
<td></td>
<td>Species abundance</td>
</tr>
<tr>
<td></td>
<td>Species distribution</td>
</tr>
<tr>
<td>Structure</td>
<td>Age-sex structure</td>
</tr>
<tr>
<td></td>
<td>Growth form</td>
</tr>
<tr>
<td></td>
<td>Vegetation height</td>
</tr>
<tr>
<td>Function</td>
<td>Ecosystem services</td>
</tr>
<tr>
<td>Indices combining</td>
<td>Species status</td>
</tr>
<tr>
<td>composition, structure</td>
<td></td>
</tr>
<tr>
<td>and function</td>
<td>Ecosystem status</td>
</tr>
</tbody>
</table>

Not just number of different species or ecosystems
Accounting for the Central Highlands of Victoria, Australia
Relationships between ecosystem, extent, condition (structure), services and species

Age of forest affects:
- Water filtration and provisioning
- Timber provisioning
- Carbon storage and sequestration
- Habitat for endangered species

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainforest</td>
<td>5069</td>
<td>113</td>
<td>226</td>
<td>7123</td>
</tr>
<tr>
<td>Montane ash</td>
<td>214</td>
<td>88589</td>
<td>36241</td>
<td>63655</td>
</tr>
<tr>
<td>Wet mixed forest</td>
<td>138397</td>
<td>17058</td>
<td>13282</td>
<td>2571</td>
</tr>
<tr>
<td>Open mixes forest</td>
<td>167442</td>
<td>15353</td>
<td>4506</td>
<td>554</td>
</tr>
<tr>
<td>Woodland</td>
<td>6142</td>
<td>190</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Montane woodland</td>
<td>22405</td>
<td>937</td>
<td>279</td>
<td>85</td>
</tr>
</tbody>
</table>

Average number of LBP per site monitored

Leadbeater’s possum
Challenges

• Improving primary data sources
• Determining the contribution of biodiversity to the value of service flows and assets
• Explaining the relationships between biodiversity, ecosystem condition and ecosystem services
• Identification and treatment of thresholds and reference condition

• Developing practical approaches to the delineation of accounting units and the impacts of these for aggregation and scale effects.

• Continuing to develop the understanding of biodiversity and accounting across professions
Spatial data – scale and aggregation

Accounting for land cover using satellite images
- 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

Accounting for land use using administrative data on valuation from the cadastre
- Agriculture (Grazing) 129.6 ha
Land cover v land use from different data sources

- Native vegetation green
- Pine plantation blue
- Unclassified area white
Opportunities

• Incorporating existing biodiversity data and indices into ecosystem accounts

  • Incorporating into ecosystem accounts existing national and international classifications (e.g. IUCN Red List)

  • Applying ecosystem accounting to the Aichi Targets

  • Applying ecosystem accounting to threaten species and protected area management

  • Using ecosystem accounting in specific policy tools (e.g. biodiversity offsets and payments for ecosystem services)
## Threatened species classification

<table>
<thead>
<tr>
<th>Common name</th>
<th>IUCN Red List</th>
<th>EPBC category</th>
<th>FFG Act</th>
<th>Vic Advisory List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadbeaters Possum</td>
<td>Endangered</td>
<td>Critically Endangered</td>
<td>Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Eastern Barred Bandicoot</td>
<td>Near Threatened</td>
<td>Endangered</td>
<td>Listed</td>
<td>Extinct in the wild ?</td>
</tr>
<tr>
<td>Mountain Pygmy-possum</td>
<td>Critically Endangered</td>
<td>Endangered</td>
<td>Listed</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>Southern Bell Frog</td>
<td>Endangered</td>
<td>Vulnerable</td>
<td>Listed</td>
<td>Endangered</td>
</tr>
<tr>
<td>Yarra Pygmy Perch</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Listed</td>
<td>Vulnerable</td>
</tr>
</tbody>
</table>
### Aichi Targets

<table>
<thead>
<tr>
<th>Target</th>
<th>Account links</th>
</tr>
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</table>
| 2. By 2020, at the latest, **biodiversity values** have been integrated into national and local development and poverty reduction strategies and planning processes and are being **incorporated into national accounting**, as appropriate, and reporting systems. | • All SEEA  
• National Balance Sheet showing value of natural resources along with the value of other assets (SNA and SEEA CF)  
• Ecosystem service accounts showing both physical levels and monetary values of services (SEEA-EEA) |
| 4. By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for **sustainable production and consumption** and have kept the **impacts of use of natural resources** well within safe ecological limits. | • Physical asset and supply-use accounts for water, timber, aquatic resources, minerals and energy (SEEA CF)  
• Ecosystem extent and condition accounts (SEEA-EEA) |
| 11. By 2020, at least 17 per cent of terrestrial land inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through **effectively and equitably managed**, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes | • Land cover/ecosystem extent and land use accounts (SEEA CF/SEEA-EEA)  
• Ecosystem condition account (SEEA-EEA)  
• Ecosystem services account (SEEA-EEA) |
IPBES - International Platform for Biodiversity and Ecosystem Services

“provides a mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations and indigenous communities.”

- Working groups established (but no-one from accounting involved so far)
- Global and regional assessment process underway – an opportunity to engage
Specific policy tools – biodiversity offsets

“...measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development...” (Business and Biodiversity Offsets Programme 2012)

• A policy instrument that seeks to achieve sustainable development (Gibbons et al 2015)
• An exchange of assets in space and time
  • Provide exchange values and metrics for accounting
  • Accounting can assist by looking a changes to services flows
Acknowledgements

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Thank you