Michael Vardon, David Lindenmayer, Heather Keith, Simon Ferrier and Phil Gibbons

michael.vardon@anu.edu.au

21st Meeting of the London Group

2-4 November 2015

Progress, challenges and opportunities for biodiversity accounting

WAVES

Wealth Accounting and the Valuation of Ecosystem Services
www.wavespartnership.org

WORLD BANK GROUP

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)

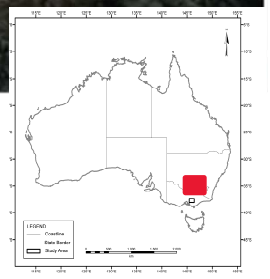
- Species diversity or richness (i.e. total number of species in a particular area or region);
- Species abundance (i.e. the number of individuals of each species);
- Species distribution (i.e. the area over which a particular species occurs);
- Species traits, including reproductive rates (the rate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

Measurement of biodiversity

	Level of diversity		
	Genetic-level biodiversity	Species-level biodiversity	Ecosystem-level biodiversity
Composition	Gene	Species richness Species abundance Species distribution	Ecosystem "richness" Ecosystem area Ecosystem distribution
Structure		Age-sex structure Growth form Vegetation height	
Function		Ecosystem services	Ecosystem services
Indices combining composition, structure and function		Species status	Ecosystem status

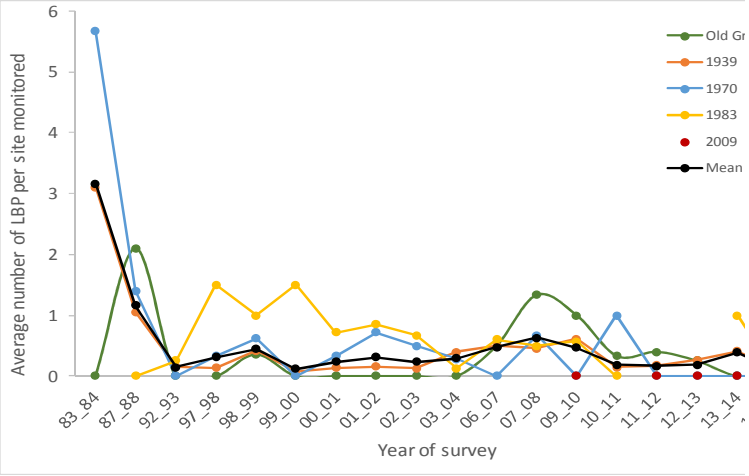
Not just number of different species or ecosystems

Accounting for the Central Highlands of Victoria, Australia



Relationships between ecosystem, extent, condition (structure), services and species

	Age class			
	<1939	1939<1983	1983<2009	>2009
	ha	ha	ha	ha
Rainforest	5069	113	226	7123
Montane ash	214	88589	36241	63655
Wet mixed forest	138397	17058	13282	2571
Open mixes forest	167442	15353	4506	554
Woodland	6142	190	30	0
Montane woodland	22405	937	279	85



Leadbeater's possum

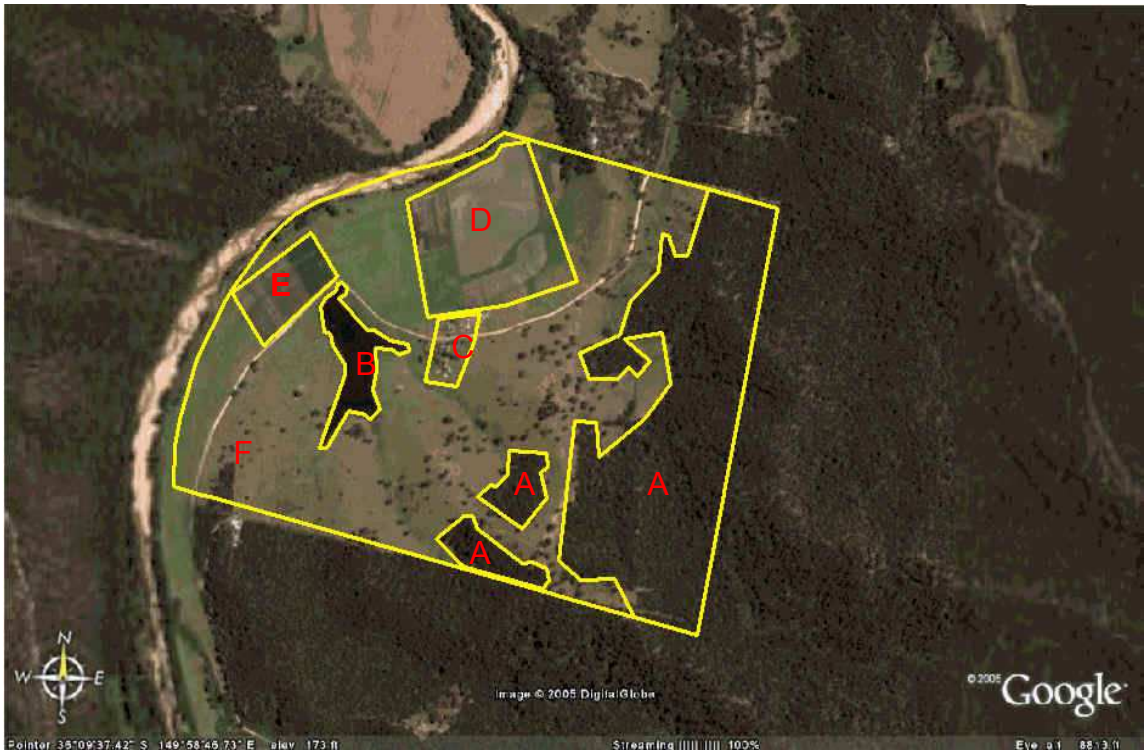
Age of forest affects:

- Water filtration and provisioning
- Timber provisioning
- Carbon storage and sequestration
- Habitat for endangered species

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

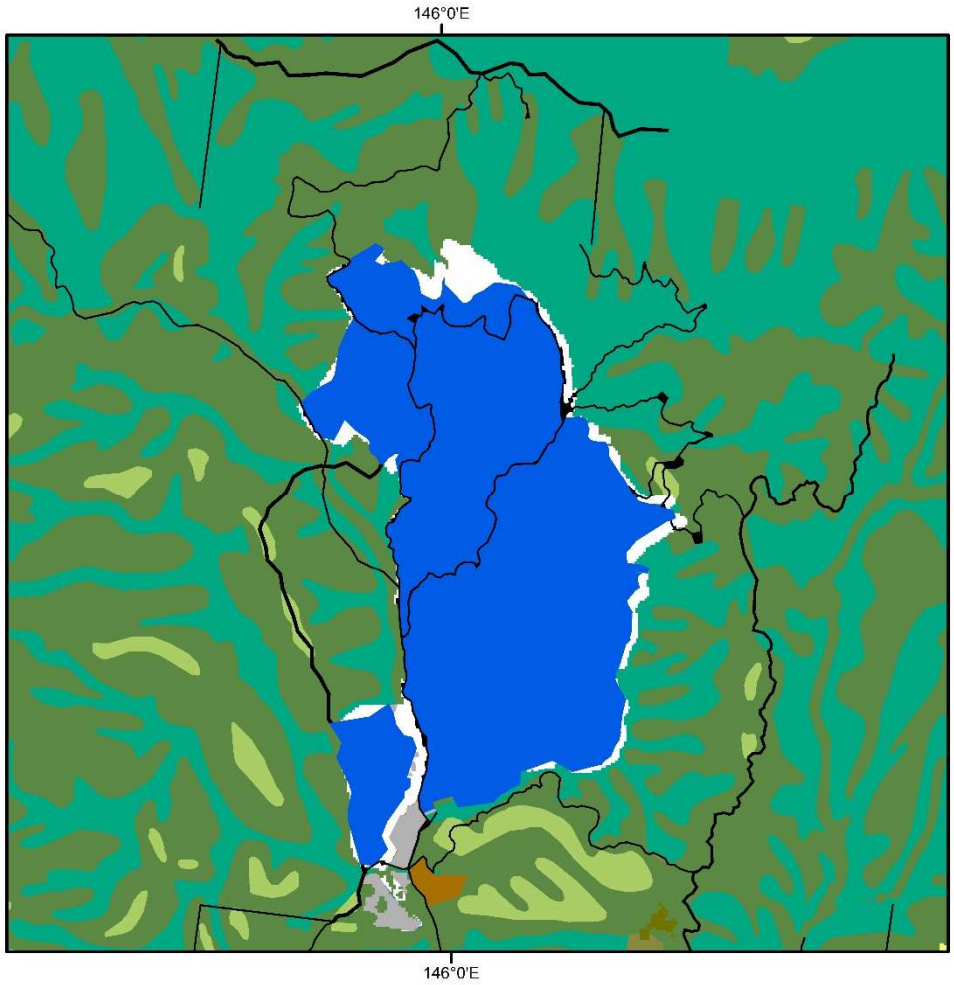
	Industry?		
Sum of AREA ha	Column Labels		
Row Labels	commercial	community	cons
bare	214	507	
cropping	0	3	
eucalypt plantation		2	
grazing	22	60	
horticulture		0	
montane ash	0	79	
mo			
op			
pin			
rai			
res			
res			
rip			
shrub and heath		0	
swamp			
TOTAL			
wet mixed forest	42	363	
woodland	2	12	
(blank)	0	24	
Grand Total	567	1590	

Native vegetation green
Pine plantation blue
Unclassified area white

Michael Vardon:
This is a use not a cover

Michael Vard
Should be op

Agriculture	Agriculture	Agriculture	Indu



Opportunities

- Incorporating existing biodiversity data and indices into ecosystem accounts
- Incorporating into ecosystem accounts existing national and international classifications (e.g. IUCN Red List)
- Appling ecosystem accounting to the Aichi Targets
- Appling 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

Common name	IUCN Red List	EPBC category	FFG Act	Vic Advisory List
Leadbeaters Possum	Endangered	Critically Endangered	Listed	Endangered
Eastern Barred Bandicoot	Near Threatened	Endangered	Listed	Extinct in the wild ?
Mountain Pygmy-possum	Critically Endangered	Endangered	Listed	Critically Endangered
Southern Bell Frog	Endangered	Vulnerable	Listed	Endangered
Yarra Pygmy Perch	Vulnerable	Vulnerable	Listed	Vulnerable

Aichi Targets

Target	Account links
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

We would like to thank the participants in the "*Metrics for Biodiversity Accounting and Policy*" held at the Centre of Excellence for Environmental Decisions at the University of Queensland November 2014.

Funding from the Fujitsu Laboratories Ltd is contributing to the study in the Central Highlands of Victoria.

John Stein prepared Figs 1 and 2 in the paper.

Thank you