

Ecosystem Accounting

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Overview

- Working model of ecosystems
 - Stages of production (boundaries)
- Classification, measuring and reporting
- Aggregation
- Application
- Policy links

Working definition of an ecosystems

- Dynamic interrelated collections of living and non-living components organized into self-regulating units
 - > Which affect each other in complex exchanges of energy, nutrients and wastes
- ***In aggregate - all exchange processes*** within ecosystems are defined as ***ecosystem function***
 - > estimate it via **condition** measures
- Define the products that are being exchanged both within and between ecosystems as ***ecosystem goods and services***



Goods and Services

- Can human intervention impact on the service
 - > Supporting
 - > Regulation and maintenance
 - > Provisioning
 - > Cultural
- If yes we need to account for it
 - But does it have to be SNA consistent?

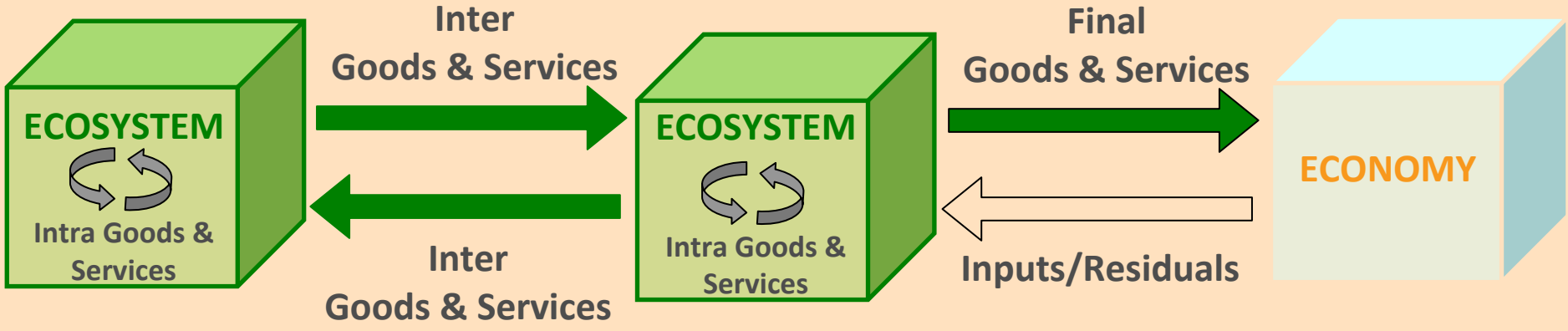
	Good	Service
Tangible <ul style="list-style-type: none"> • can be touched, gripped, handled, looked at, smelled, tasted 	✓	✗
Perishable <ul style="list-style-type: none"> • when the service has been completely rendered, it irreversibly vanishes as it has been consumed 	✗	✓
Separatable <ul style="list-style-type: none"> • consumption can be separated from delivery 	✓	✗
Simultaneous <ul style="list-style-type: none"> • rendering and consumption must occur during the same period of time 	✗	✓
Variable <ul style="list-style-type: none"> • regarded as heterogeneous or lacking homogeneity and are typically modified for each consumer or each new situation 	✗	✓

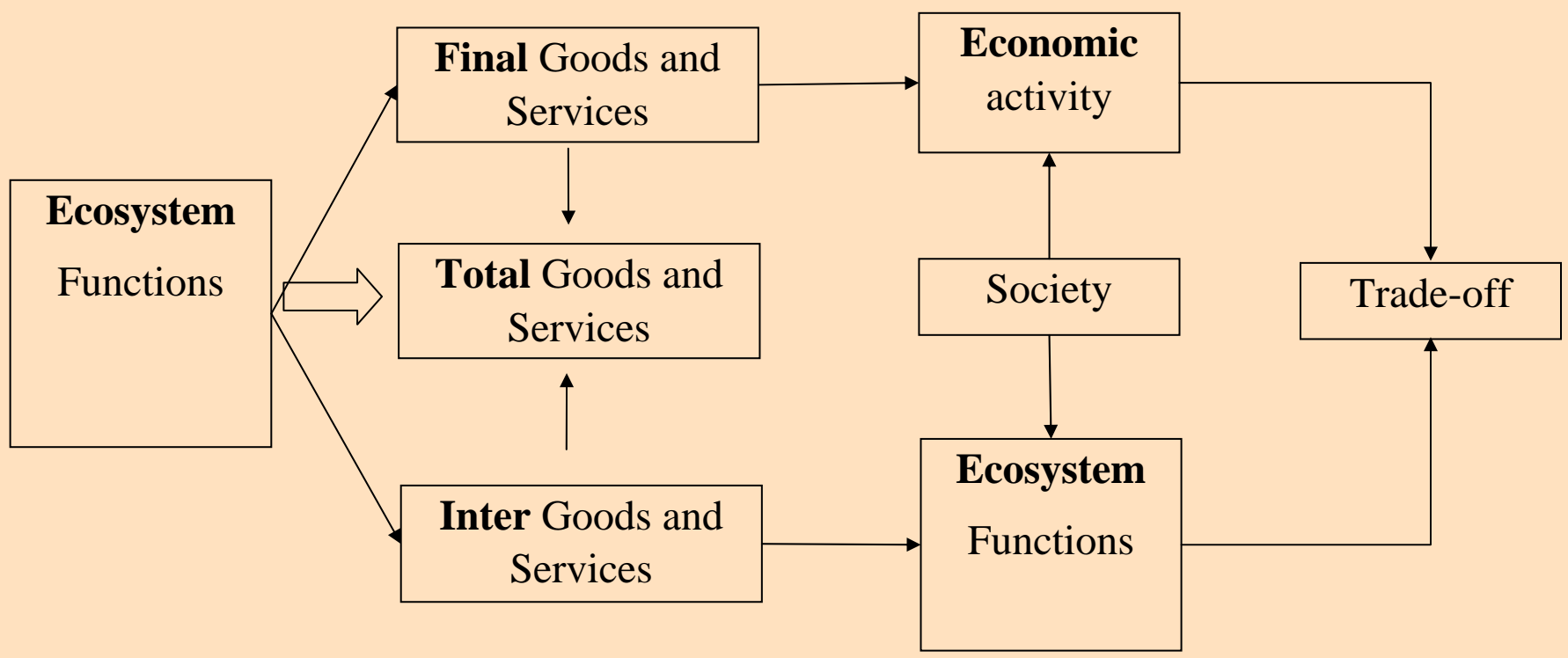
Ecosystem goods and services

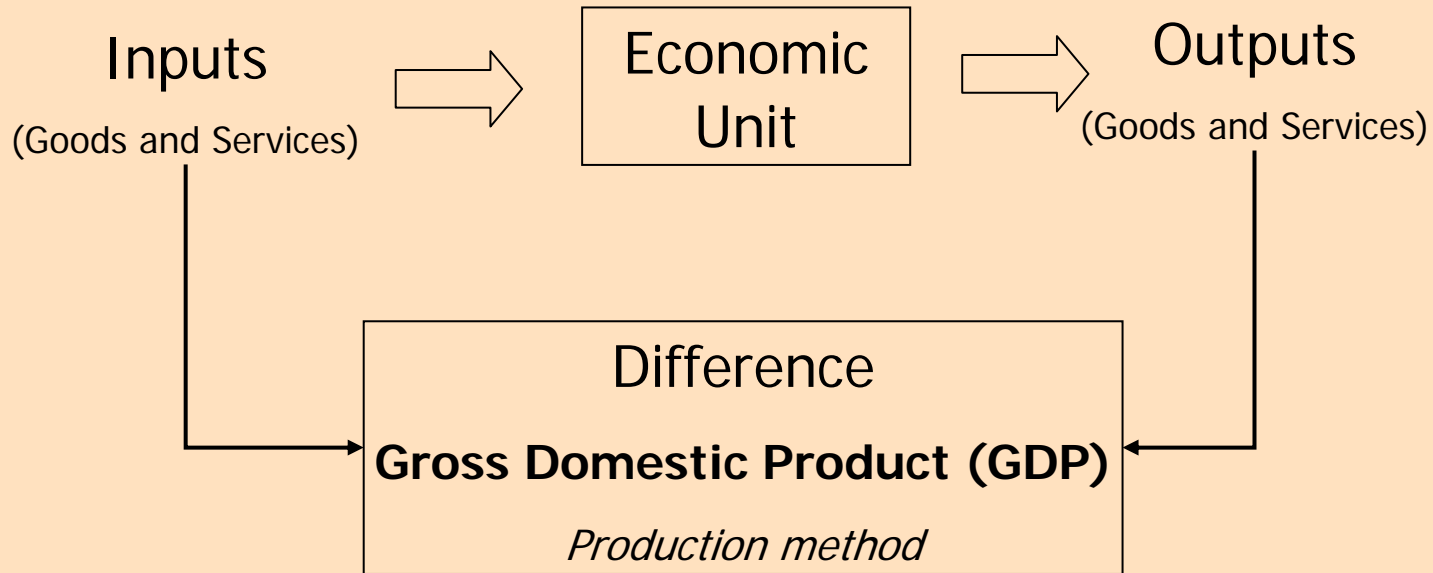
Ecosystem functions generate	Within ecosystem 'Intra'	Between ecosystems 'Inter'	Ecosystem to economy 'Final'
Goods	1) A dead tree falling to the ground Nutrients	2) Water, soil (erosion)	3) Wood, water, minerals, cultivated natural resources
Service	4) A hollow log providing shelter Pollination	5) Pollination Bird carrying a seed between ecosystems	6) The tree remains in the forest for picnics Clean water to swim in

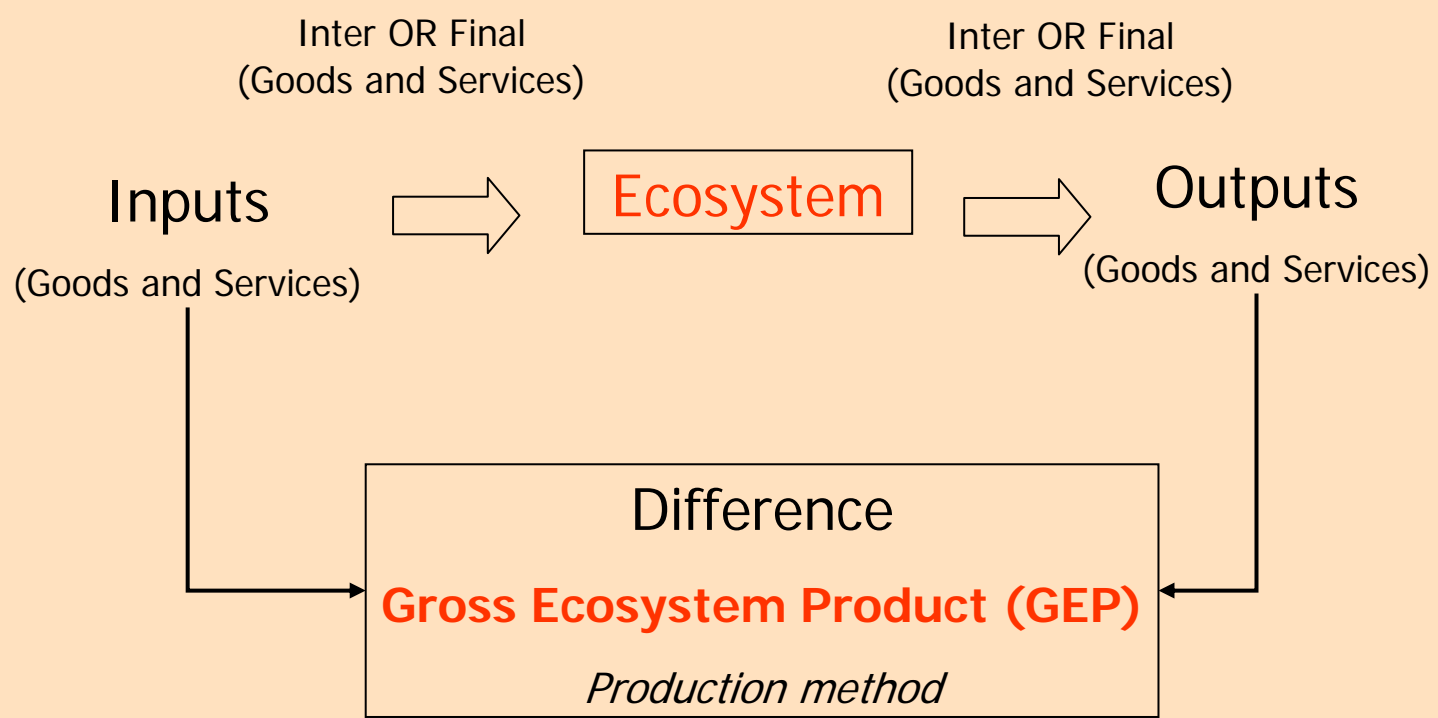


Linking ecosystems to the economy







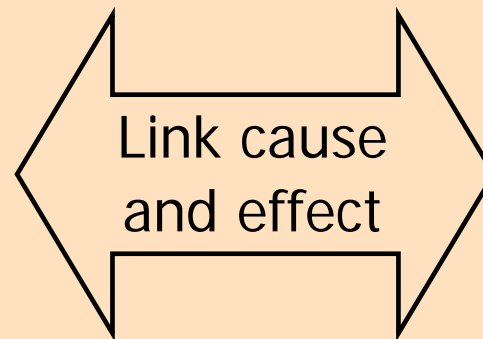


Gross Ecosystem Product (GEP)

Production method

Ecosystem **Statistics**

Linking ecosystems to one another
and the economy (Not SNA
compliant)



Ecosystem **Accounting**

Link goods and services to the
economy (SNA Standards)

Classification – analytical units

- Inclusive of all land
 - Natural to human dominated, complete coverage
- Homogeneity of units
 - Spatial and temporal dimensions considered
 - *Need to be able to assume homogeneity within units*
 - *Leads to determination of resolution (grid size) of analytical units to minimise error and uncertainty*
- *Boundaries solution*
 - *The analytical unit is a unit for accounting purposes*
 - *It is the interface for the flow of goods and services*

Classification - attributes

- Information used to classify ecosystem assets, goods and services
- Endogenous and exogenous
 - Soil type, rainfall
- A class is another form of an attribute
 - Single or many attributes
 - Rules need to be well defined (MECE)
 - It is a *grassland* because it meets a well defined set of rules
 - > Interpretation of attribute values

Measurement

- Observation
 - Appropriate scale for the attribute
 - Connectivity – landscape scale
 - Soil Type – local scale
- Sampling is a method of observation
 - Followed by statistical extrapolation and imputation to the analytical unit scale
- Indicators
 - Are observable attributes that represent indirect measurements of some ecosystem characteristics
 - Can be used to infer attributes using modelling (casual or associative) techniques
- Interpretation
 - Some idea in mind of a benchmark (differential concept)

Reporting

- Report based on classification
 - *Common currency – spatial, temporal scale of the analytical unit*

Erosion (tons per ha per year)	Vegetation Quality (% relative to benchmark)					Total Ha
	<20 (Low)	20-40	40-60	60-80	80-100 (High)	
<0.5	3	4	15	10	8	40
0.5-1.0	10	6	12	8	3	39
1.0-1.5	13	10	8	4	2	37
1.5-2.0	40	14	7	3	1	65
>2.0	80	16	5	2	1	104
Total Ha	146	50	47	27	15	285



Aggregation

- Based on the strength of relationship for goods and services to be exchanged
- Identified using class labels and assigning to all analytical units
 - Therefore no one single classification scheme
 - Can be based on any **collection of attributes**
 -that link with the strength of the relationship (ideally)
- Explicitly recognises interdependency between ecosystems
 - Degradation and resilience (supply of inter services)
- From the bottom up.....

Observations

- SEEA-EEA
 - Services that provide benefits to humanity
 - *We account for all goods and services that benefit both humanity and other ecosystem assets*
 - > *We recognise there is a link between all ecosystem assets, goods and services that benefit humanity*
 - > *Human consumption of goods and services (final) is a subset of all goods and services*
 - > *All (inputs and) outputs accounted for between all ecosystem assets (differential accounting – value add)*
 - > Gross Ecosystem Product (GEP)

Policy links

- Actively manage the dependencies between ecosystems
- Net output of ecosystems (both final and inter)
- Return on investment in condition – flow of ecosystem goods and services
- Inclusive rather than exclusive assessment of all flows
- Links to economic actors!

Eigenraam et al 2011 (London)

Table 4. Physical Account for land assets

Land - Physical (ha)	Agriculture	Forestry	Aquaculture	Use of built up and related areas	Land used for maintenance and restoration of environmental functions	Other uses of land	Land not in use	Total
Opening stock	739,687	120,430	-	82,359	758,572	3,400	9,371	1,713,819
Additions to stock								
Acquisitions								
Reclassification					1263			
Reduction in stock								
Natural losses								
Reclassification	-1263							
Closing balance	738,424	120,430	-	82,359	759,835	3,400	9,371	1,713,819

Eigenraam et al 2011 (London)

Table 3. Physical Account for Environmental Benefits Index

EBI - Physical Account	Agriculture	Forestry	Aquaculture	Use of built up and related areas	Land used for maintenance and restoration of environmental functions	Other uses of land	Land not in use	Total
Annual EBI Flow to 30 June 2010	271,304,904							271,304,904
Increase in EBI flow due to:								
Acquisitions					35,855,034			35,855,034
Reclassification					270,155,361			270,155,361
Reduction in EBI flow due to:								
Natural losses	(84,838)							(84,838)
Reclassification	(270,155,361)							(270,155,361)
Annual EBI Flow to 30 June 2015	1,064,706				306,010,395			307,075,101
Change in annual flow								35,770,196

Eigenraam et al 2011 (London)

Table 2. Condition Scores Environmental Assets for West Gippsland

EBI – Condition Elements	Terrestrial Assets	River Assets	Wetland Assets
Opening Condition	61,769.50	22,919.72	2,381.61
Additions to condition			
Acquisitions	7,130.09	3,837.56	241.06
Reclassification			
Reduction in condition			
Natural losses	-141.44	- 51.68	-0.02
Reclassification			
Closing condition	68,758.16	26,705.60	2,622.64



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VALUING OUR ENVIRONMENT



End

Thank you!

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