Overview of the UN System of Environmental-Economic Accounting (SEEA)

IARIW Training in Advanced Topics in National Accounts

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22 August, 2022

Overview of the workshop

1. Context for the SEEA

2. Main components of the SEEA
- SEEA Central Framework
- SEEA Ecosystem Accounting
- Role of accounting

3. Focus on ecosystem accounting
- Concepts
- Examples

4. Linking SEEA to the SNA revision

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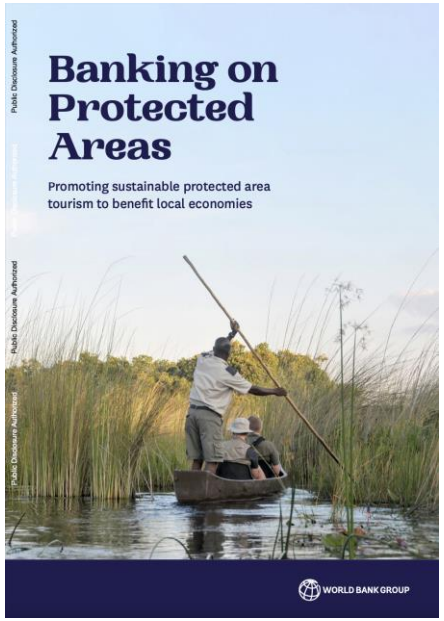
1. Context for SEEA

Environmental sustainability is an economic and social challenge



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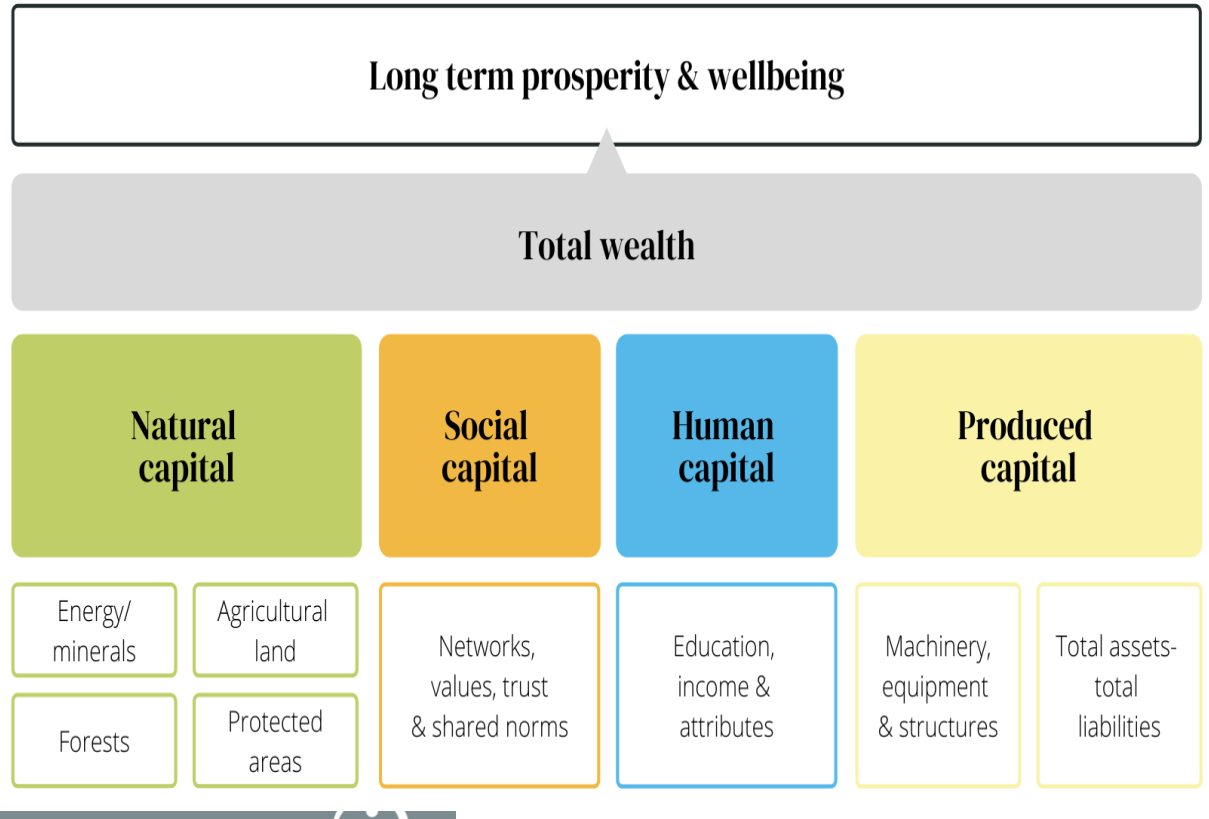
Beyond GDP – Recognising natural capital

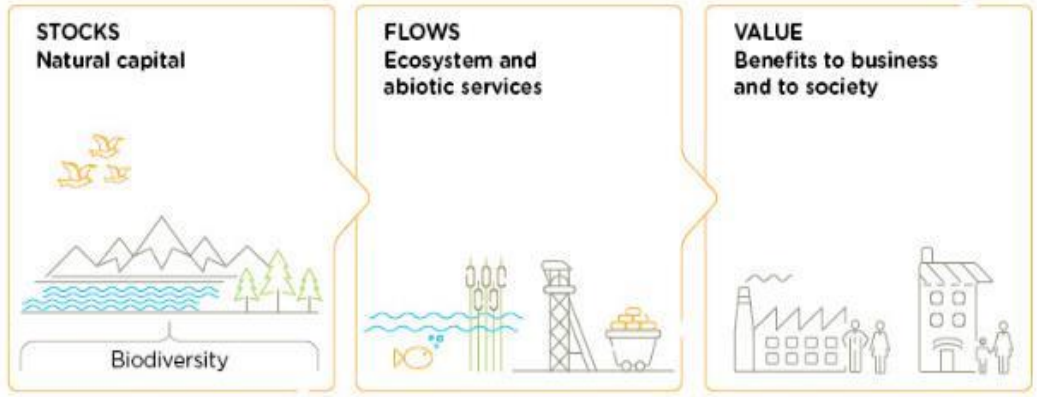
"A country could exhaust it's mineral resources, cut down its forests, erode its soil, pollute its aquifers, and hunt its wildlife to extinction but measured income would not be affected as these assets disappeared"

(Repetto, 1986)



Adapted from https://www.wavespartnership.org/en/wealth-accounting-and-WAVES

Natural Capital
is the **stock** of renewable and non-renewable **natural resources**, (e.g. plants, animals, air water, soils, minerals) that combine to yield a **flow** of benefits to people
(Natural Capital Protocol, 2016)



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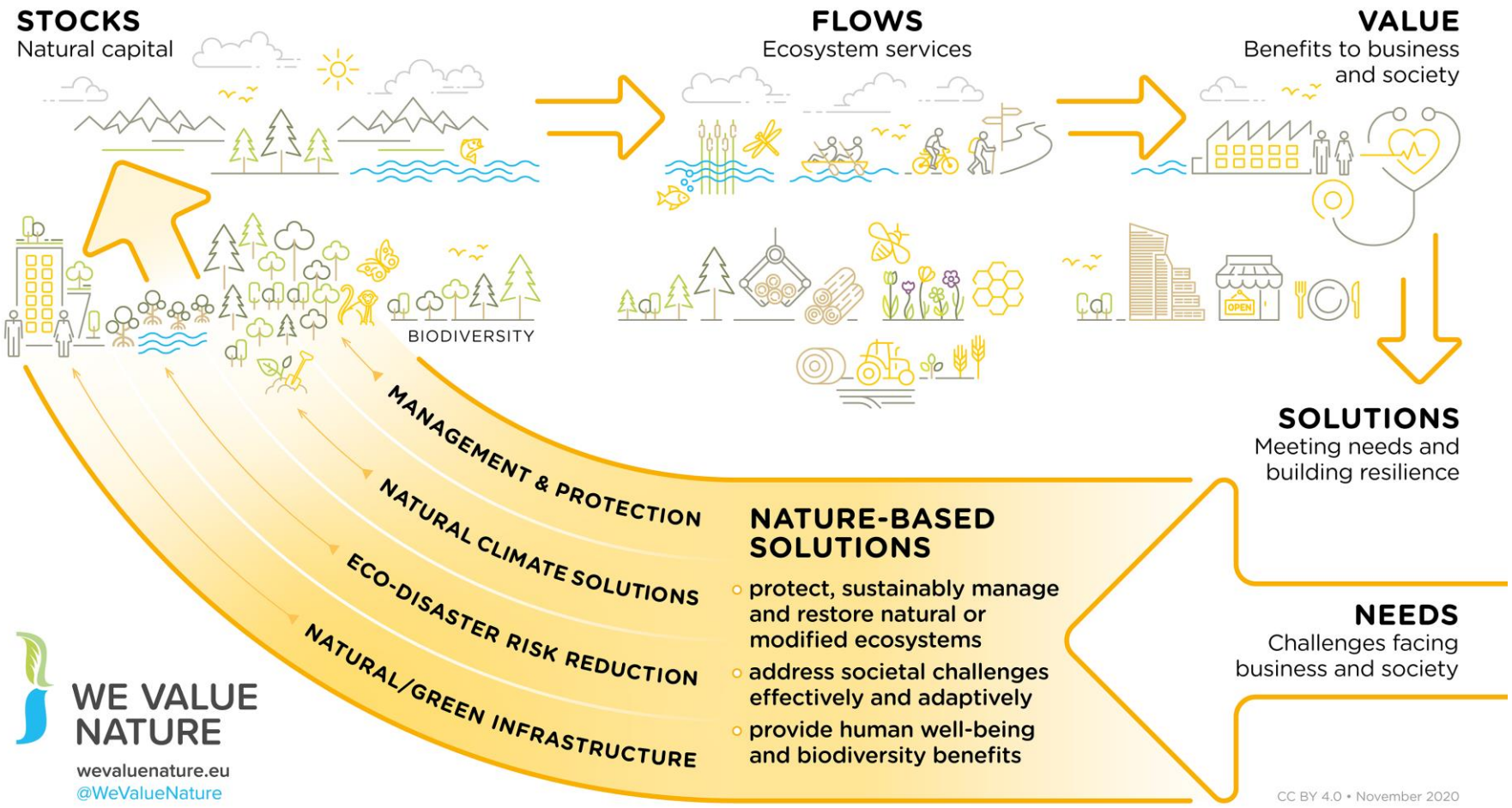
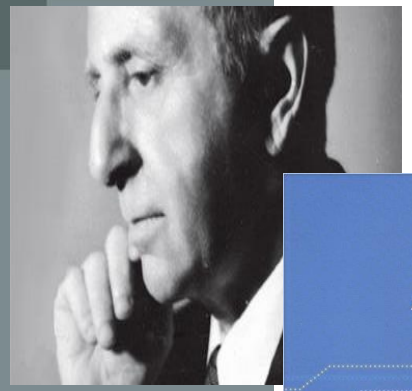
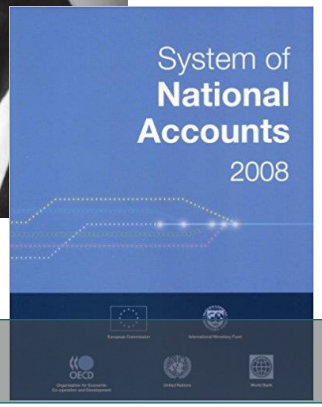
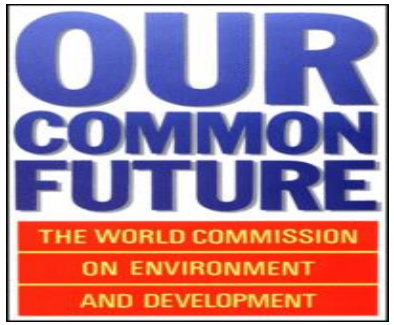
Investing in nature

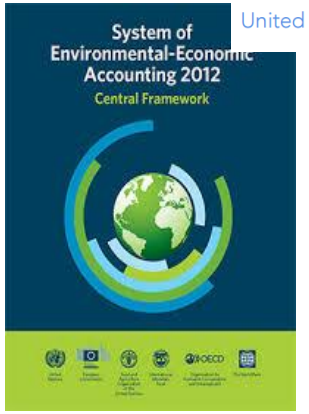


Timeline for SEEA and NCA





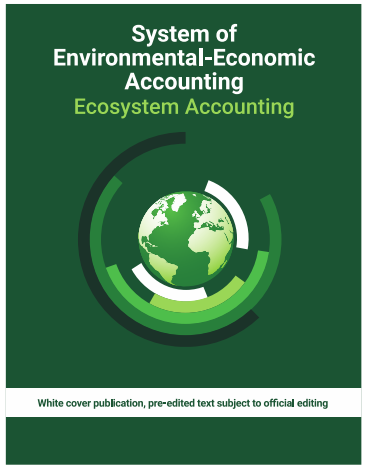


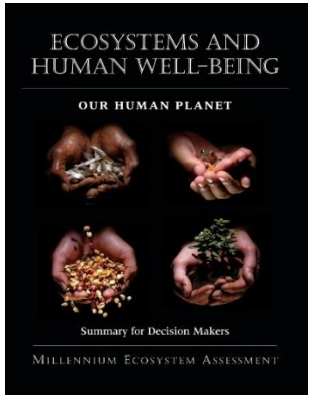


United Nations

System of Environmental Economic Accounting

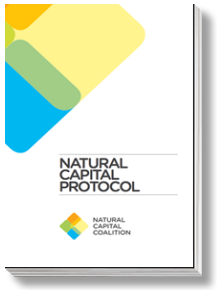
SUSTAINABLE DEVELOPMENT GOALS





RIO+20

WAVES



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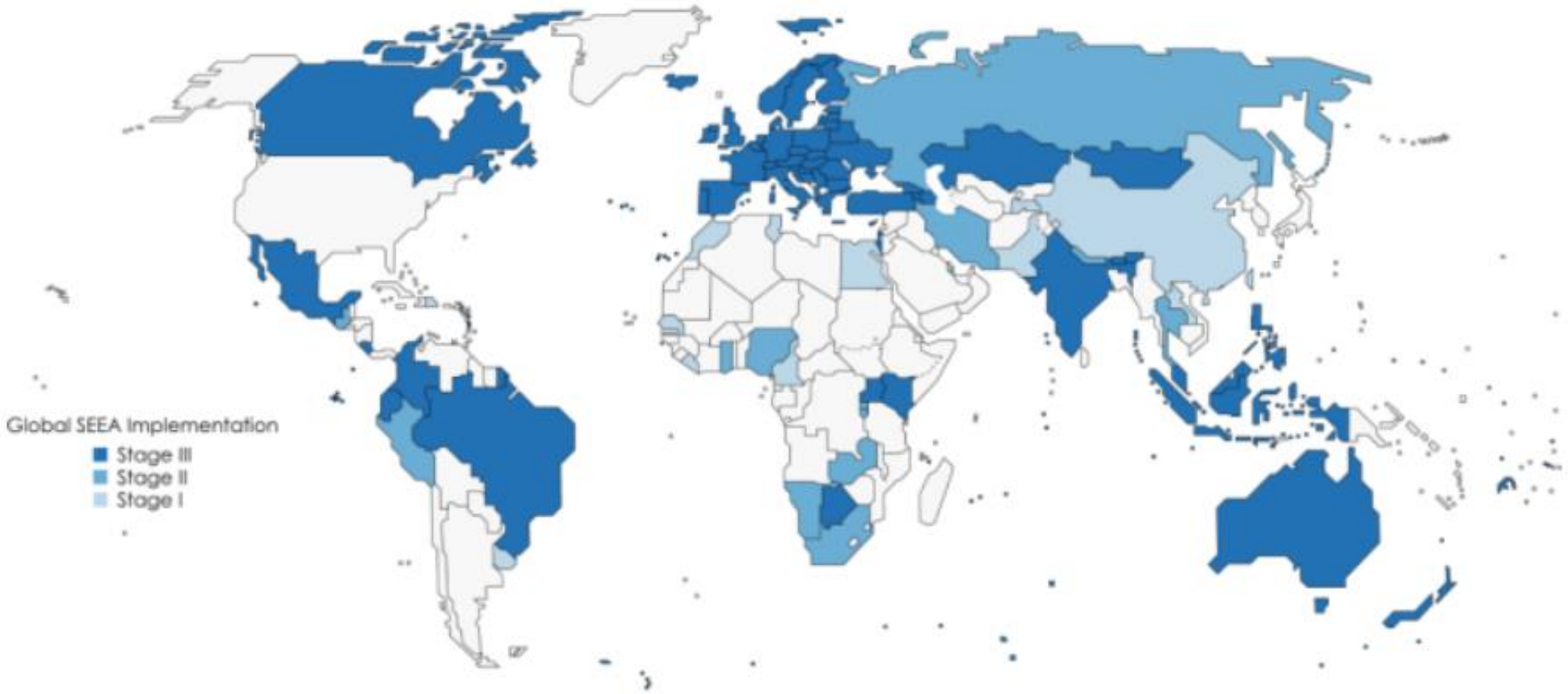
Adopting and implementing the SEEA



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SEEA and global sustainability initiatives – a quick summary

High-level endorsement for the implementation of the SEEA from UN Secretary General and in G7 communiques

Direct role for the SEEA in reporting on the Convention on Biological Diversity (CBD) and the SDGs

Application in EU legislation and supporting World Bank work on wealth accounting

Connection and discussions with other initiatives including:

- IPBES (biodiversity and ecosystem services)
- UNCCD (desertification)
- UNFCCC (climate change)
- GEOBON (earth observation for biodiversity)
- IUCN and nature based solutions
- …..

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Natural capital in the corporate sector – a quick summary

Sustainability a long-standing concern in the private sector:

- ESG – Environment, Social and Governance Risk assessments
- Triple Bottom Line assessments
- Sustainability metrics and non-financial reporting

Renewed push through Millennium Ecosystem Assessment (2005) and TEEB (2010):

- TEEB for Business -> Natural Capital Coalition -> Capitals Coalition
  - Natural Capital Protocol (2016)
  - Sector Guides (Food, Forestry, Finance with UNEP-FI, Biodiversity, …)
- GRI, SASBI, IIRC, A4S, TCFD, Value Balancing Alliance, Transparent, Align, ISSB, SBTN …
- Taskforce for Nature-related Financial Disclosure (TNFD)

Many, many supporting tools and frameworks, including

- Carbon and water footprinting, Biodiversity metrics
- ISO valuation standards
- Data repositories
- Assessments of ecosystem services, risk assessment tools (ENCORE)
- Multiple capital scorecards
- Environmental profit and loss
- Biodiversity Protocol (Houdet)
- Accounting for liabilities (Ogilvy et al)
- UK British Standards Institute NCA for Organisations….

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2. SEEA's Main components

Two sides of the System of Environmental-Economic Accounting (SEEA)

Measures environmental assets and individual resources and how the economy used them.


Timber


Water


Fish

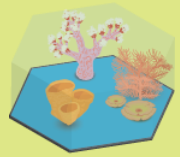

Soil

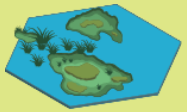

Minerals

Measures ecosystems and the services they provide to economic and human activity.


Forests


Rivers


Coral reef


Wetlands

Asset & Resources + Ecosystems = SEEA

Source: UN Statistics Division

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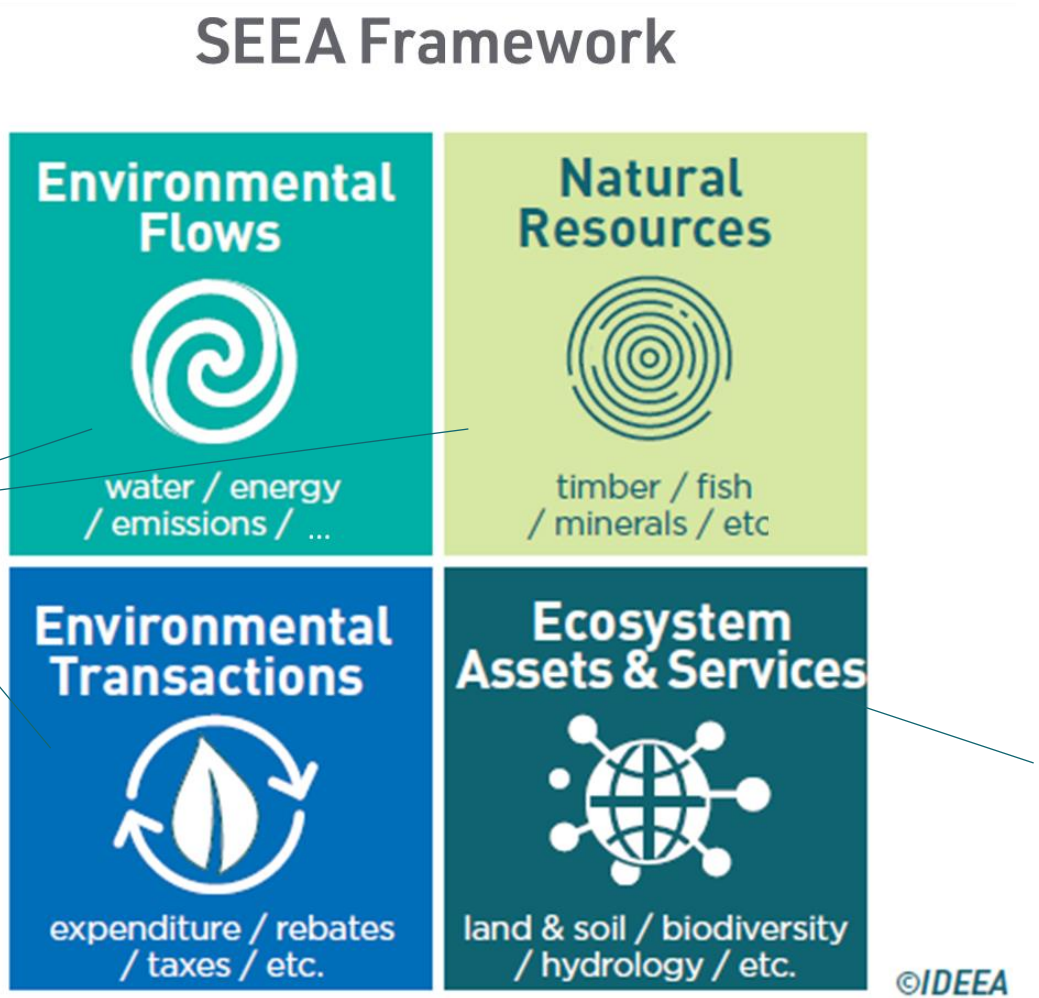
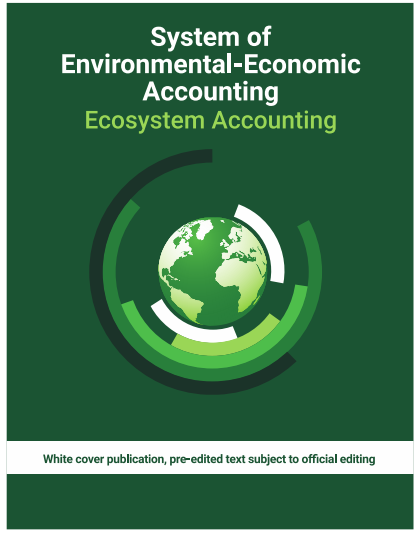
UN System of Environmental-Economic Accounting (SEEA)

Comprehensive accounting-based framework to record the relationship between the environment and the economy and people





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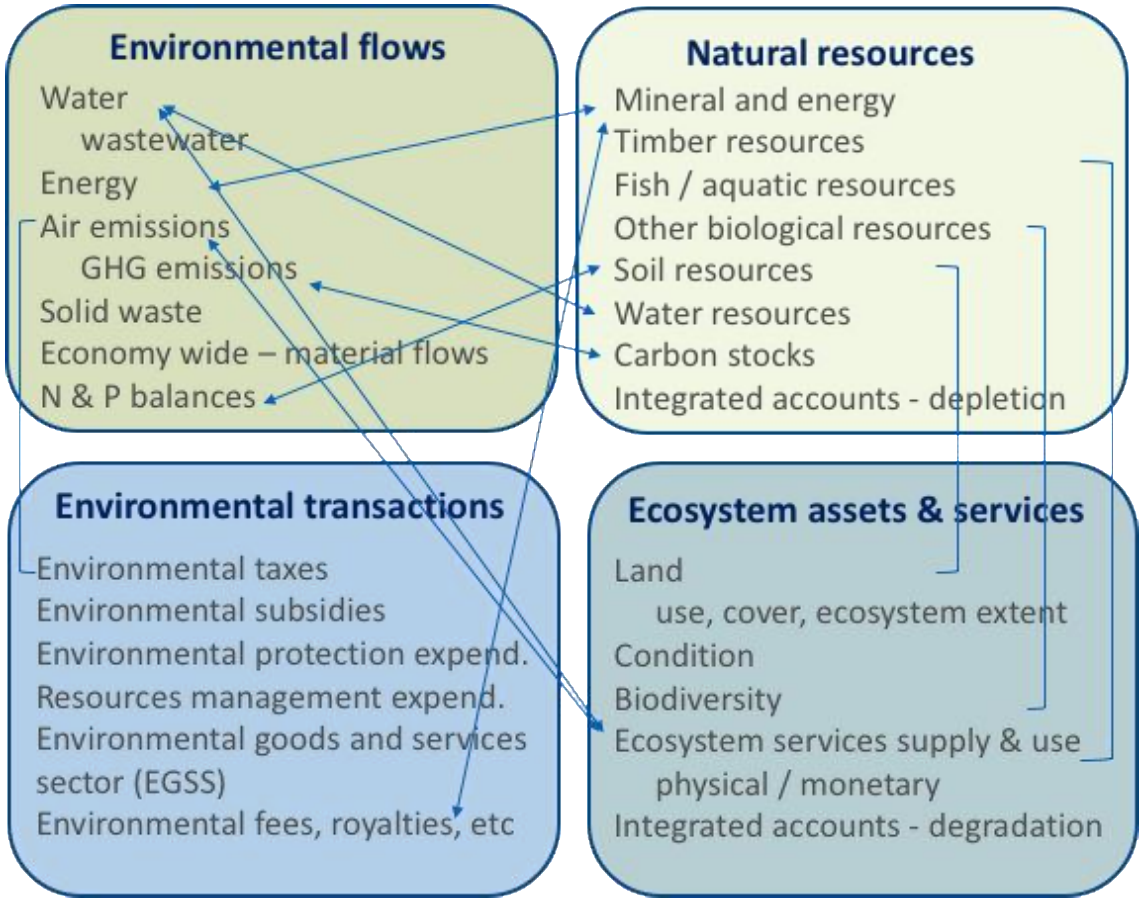
Connections between the SEEA Accounts



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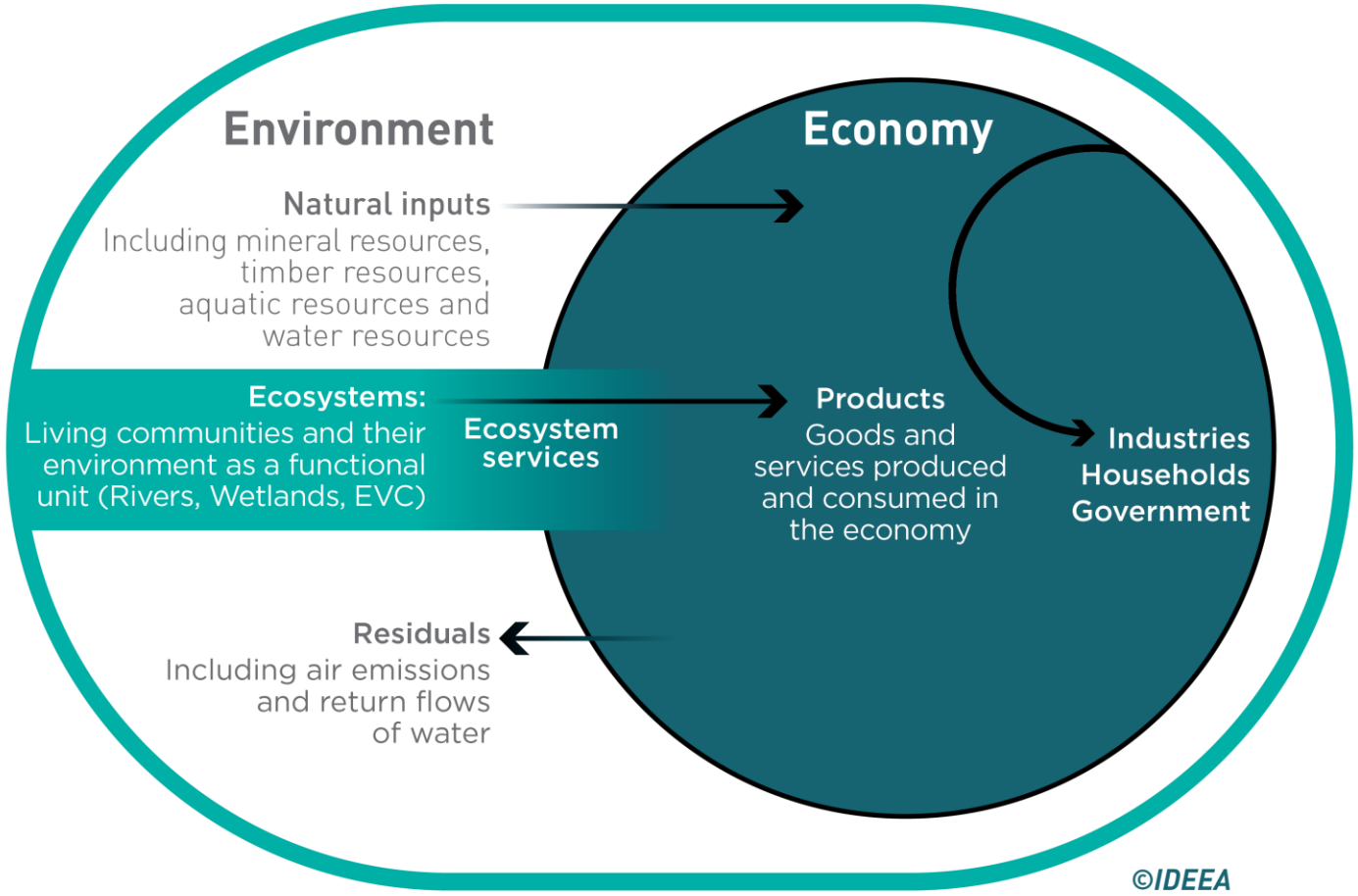
Nested systems framing



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Accounting for physical flows

Aim to record all flows between the environment and the economy

One account for each type of flow in the form of a supply and use table

Main physical flow accounts concern:

- Water
- Energy
- Air emissions, including GHG emissions
- Solid waste

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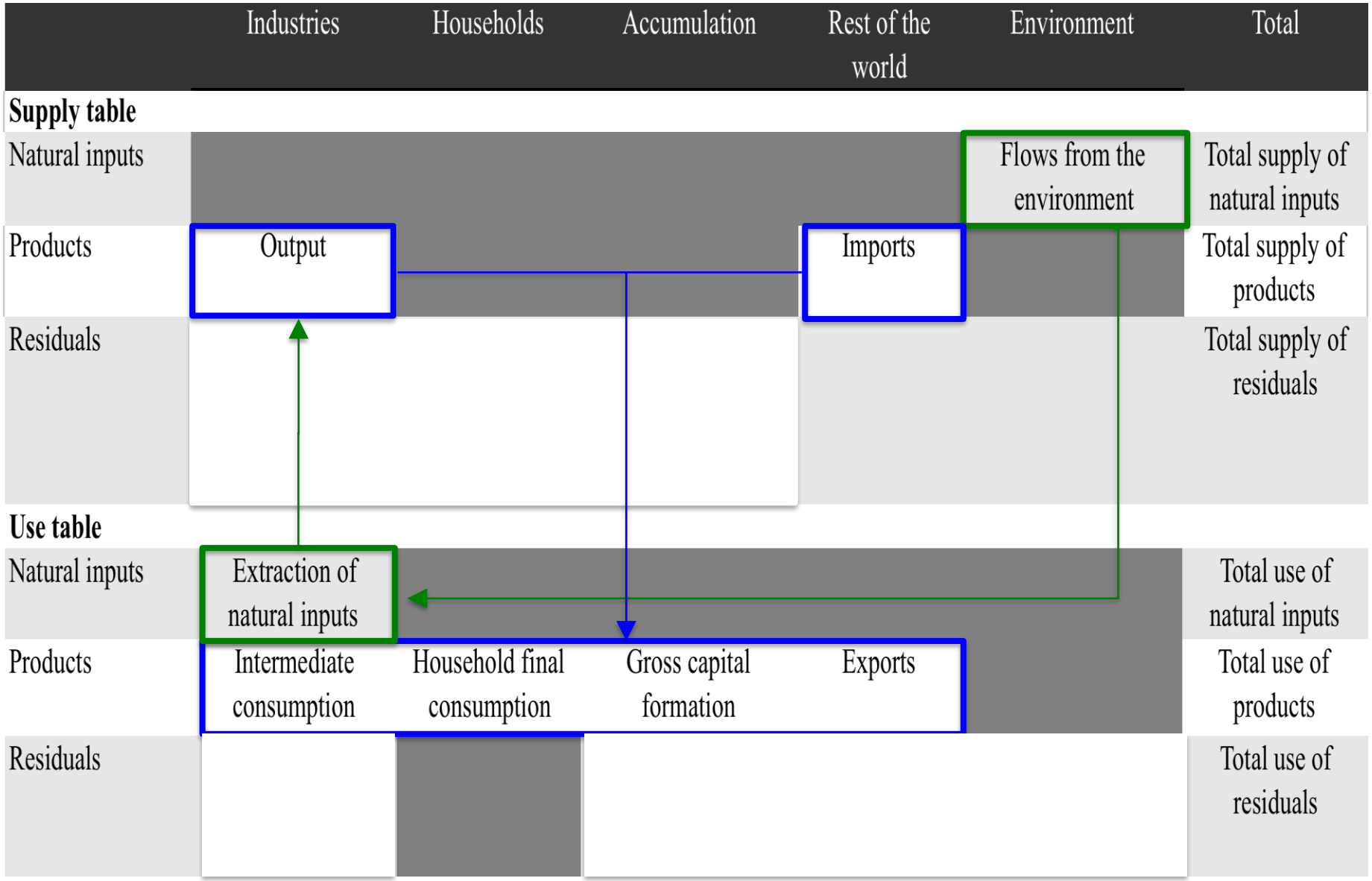
Supply and use tables – Environment to Economy



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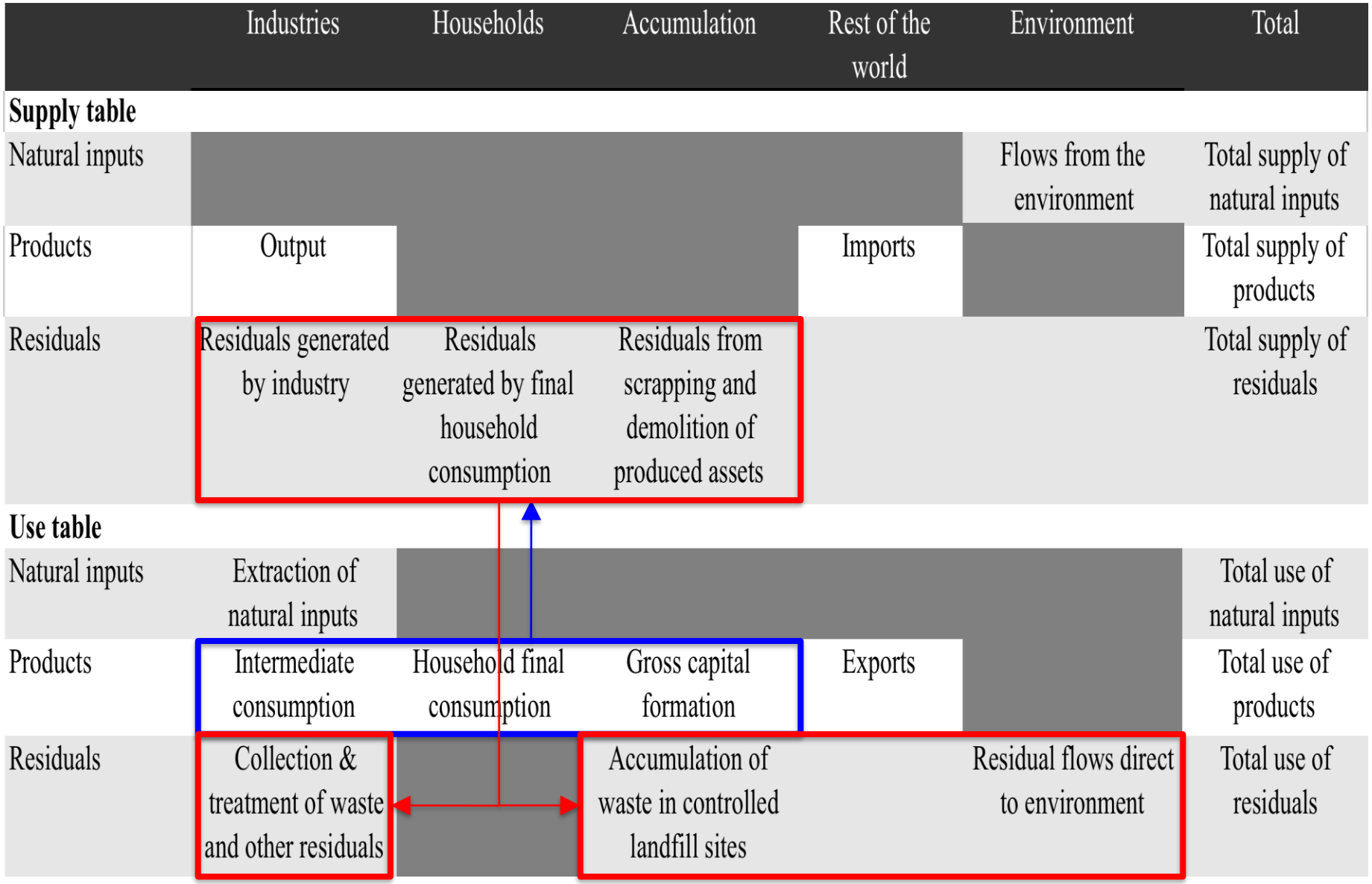
Supply and use tables – Economy to Environment



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Accounting for environmental activities

Aim to identify and record relevant transactions already recorded within the SNA that pertain to the environment

Main types of transactions

- Environmental taxes and subsidies
- Environmental protection and resource management expenditure (and financing)
- Environmental Goods and Services Sector (EGSS)
- Environmental permits and access payments (e.g. royalties)

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Accounting for environmental assets

Environmental assets: "*Naturally occurring living and non-living components of the Earth, together comprising the bio-physical environment, that may provide benefits to humanity*" (SEEA Central Framework, para 2.17)

Central Framework focus on individual components / resources

- Mineral & energy resources
- Land and soil resources
- Timber resources, aquatic resources (incl. fish)
  - Includes both natural and cultivated resources
- Water resources

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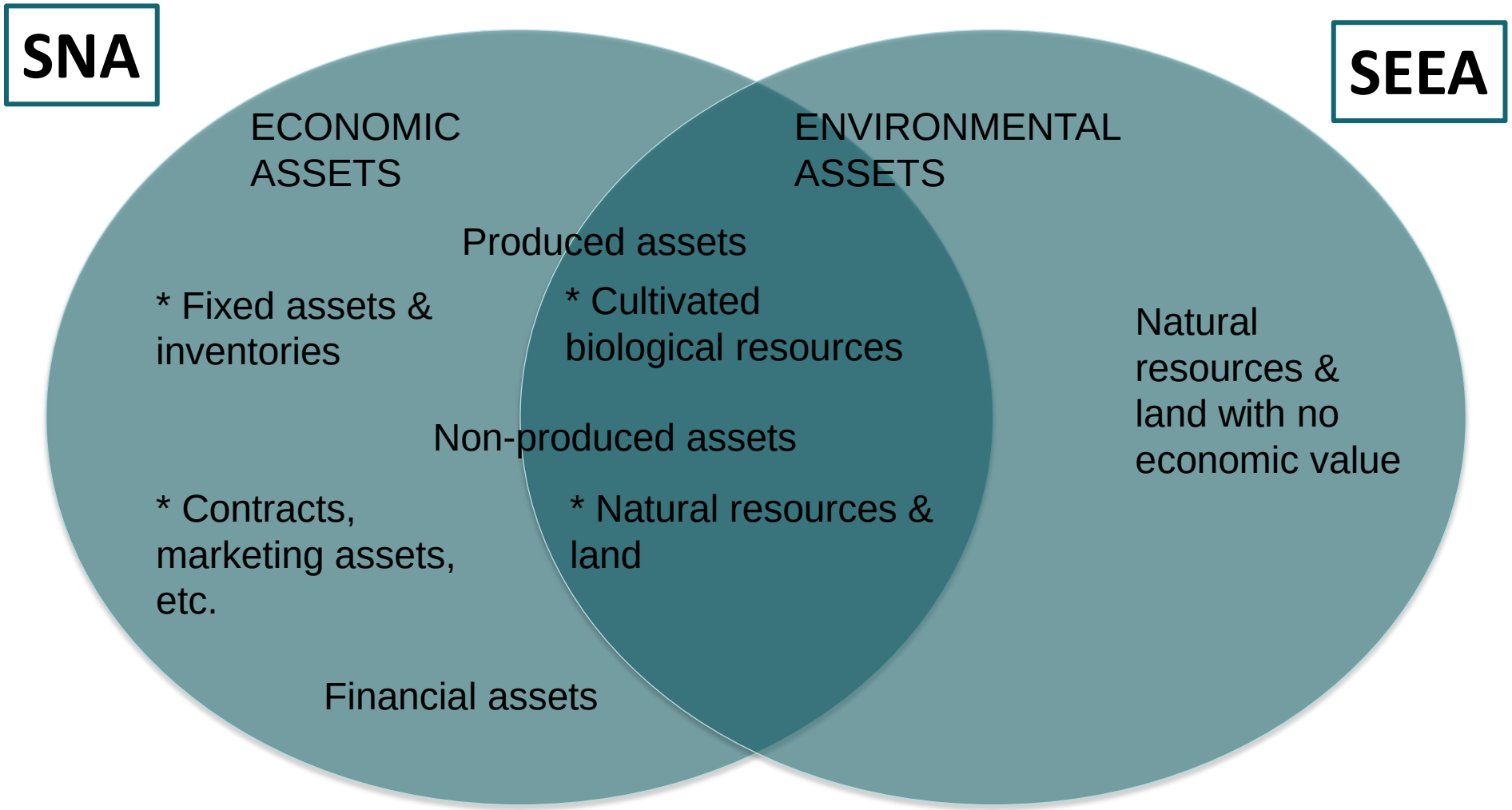
Environmental and economic assets



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Basic form of asset accounts

Opening stock of environmental assets			
Additions to stock			
	Growth in stock		
	Discoveries of new stock		
	Upward reappraisals		
	Reclassifications		
	Total additions of stock		
Reductions of stock			
	Extractions		
	Normal loss of stock		
	Catastrophic losses		
	Downward reappraisals		
	Reclassifications		
	Total reductions in stock		
Revaluation of the stock*			
Closing stock of environmental assets			

Source: UN et al. (2014) SEEA Central Framework

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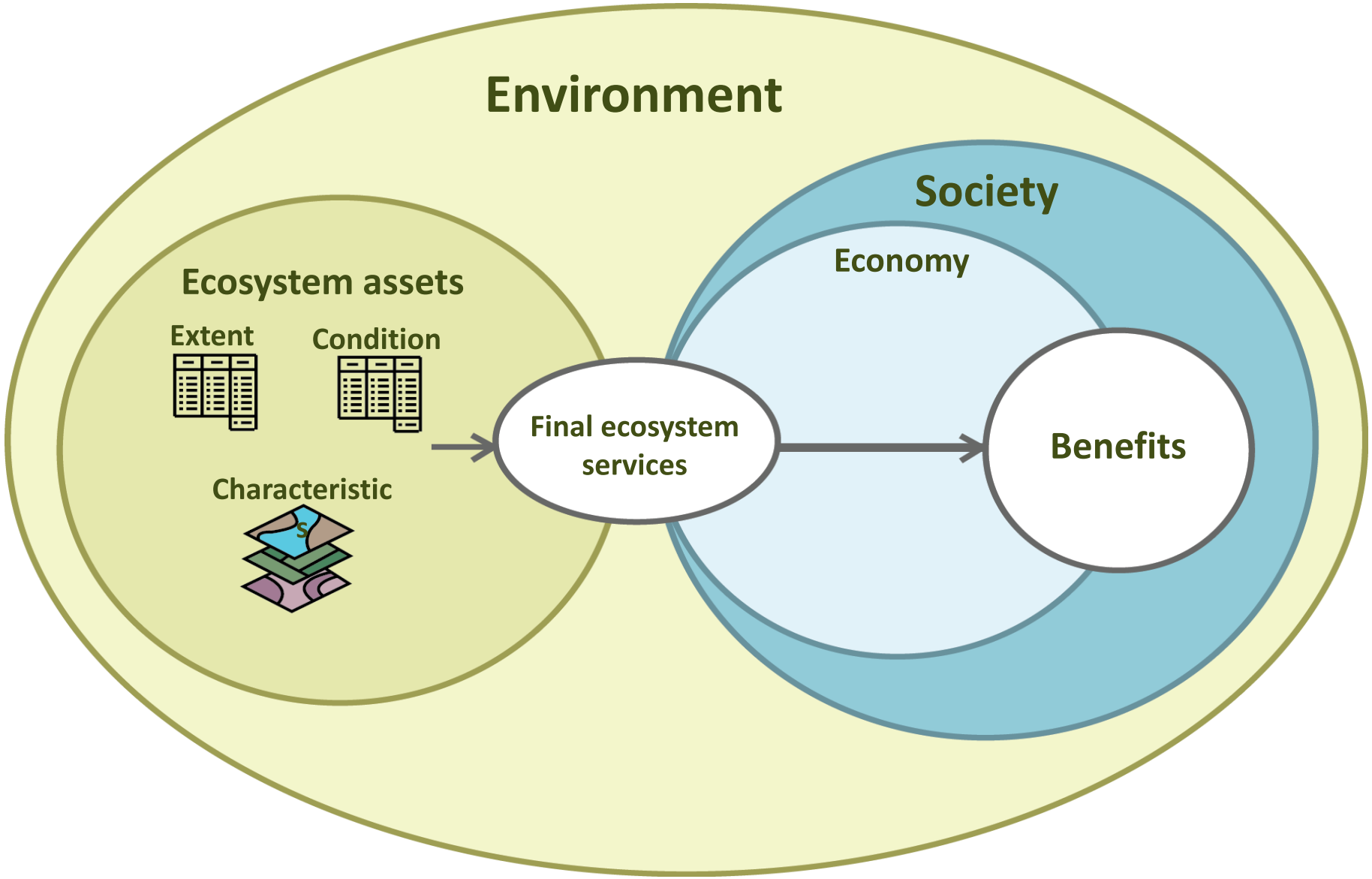
General Ecosystem Accounting Framework



Source: UN Statistics Division

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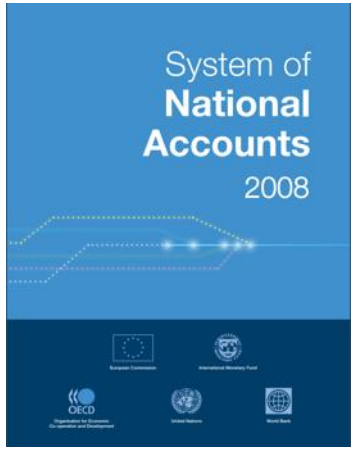
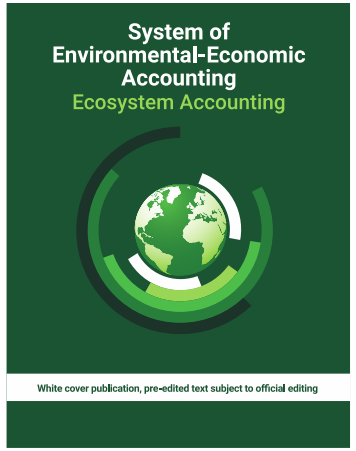
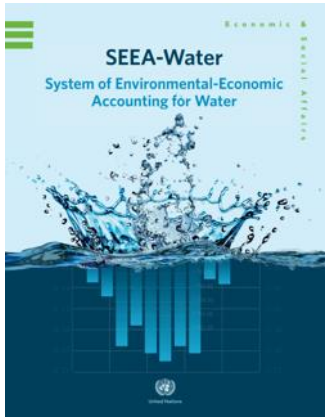
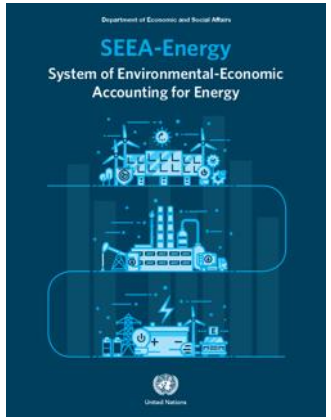
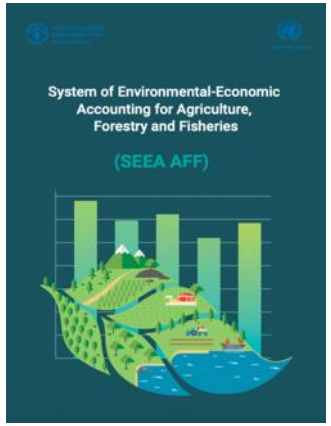
The wider SEEA "family"











Advancing on:

- Ocean Accounts
- Measuring the Sustainability of Tourism
- Accounting for Biodiversity

Implementation:

- Around 100 countries with SEEA programs
- Links to global reporting SDG, CBD, UNCCD, IPBES, IUCN

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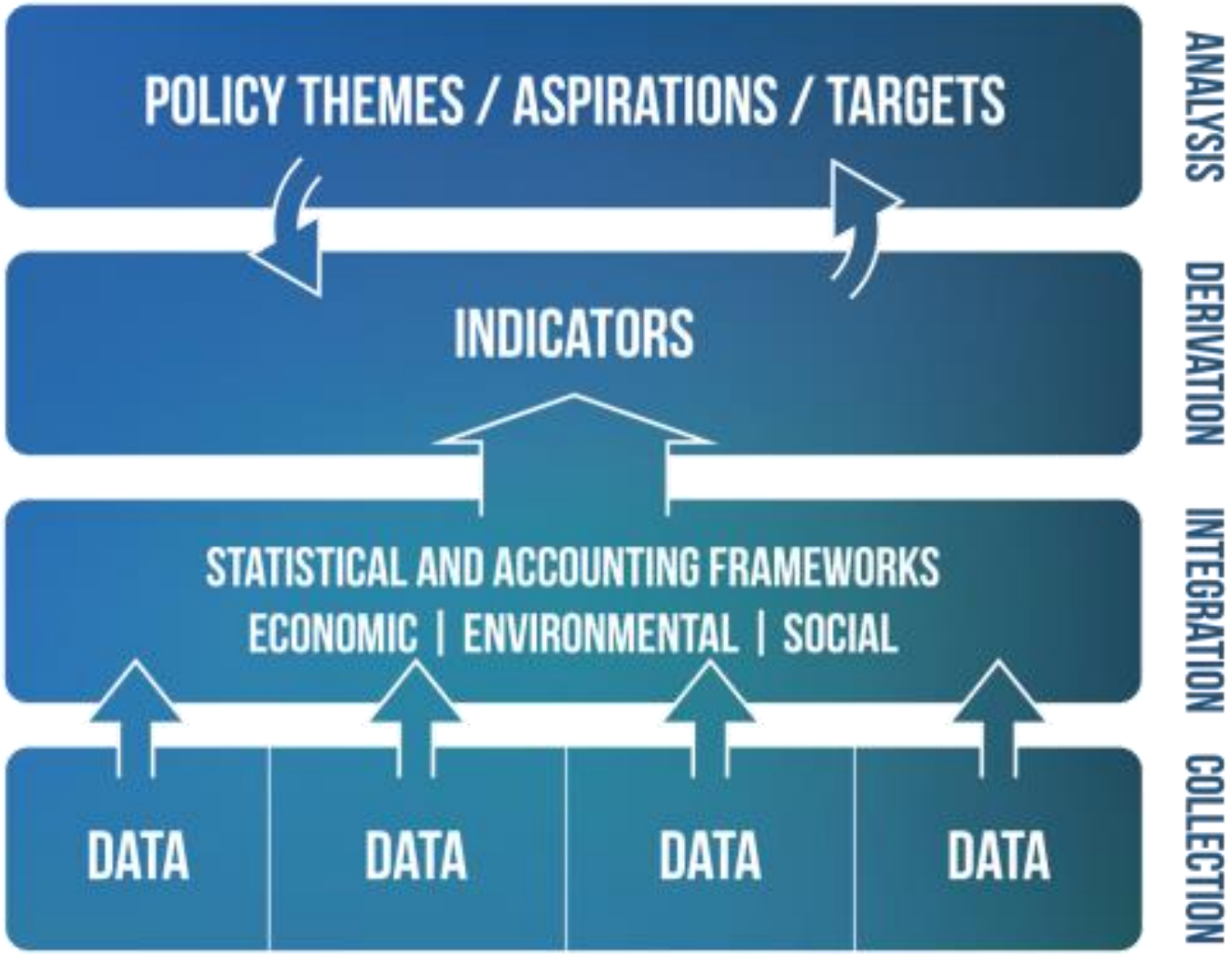
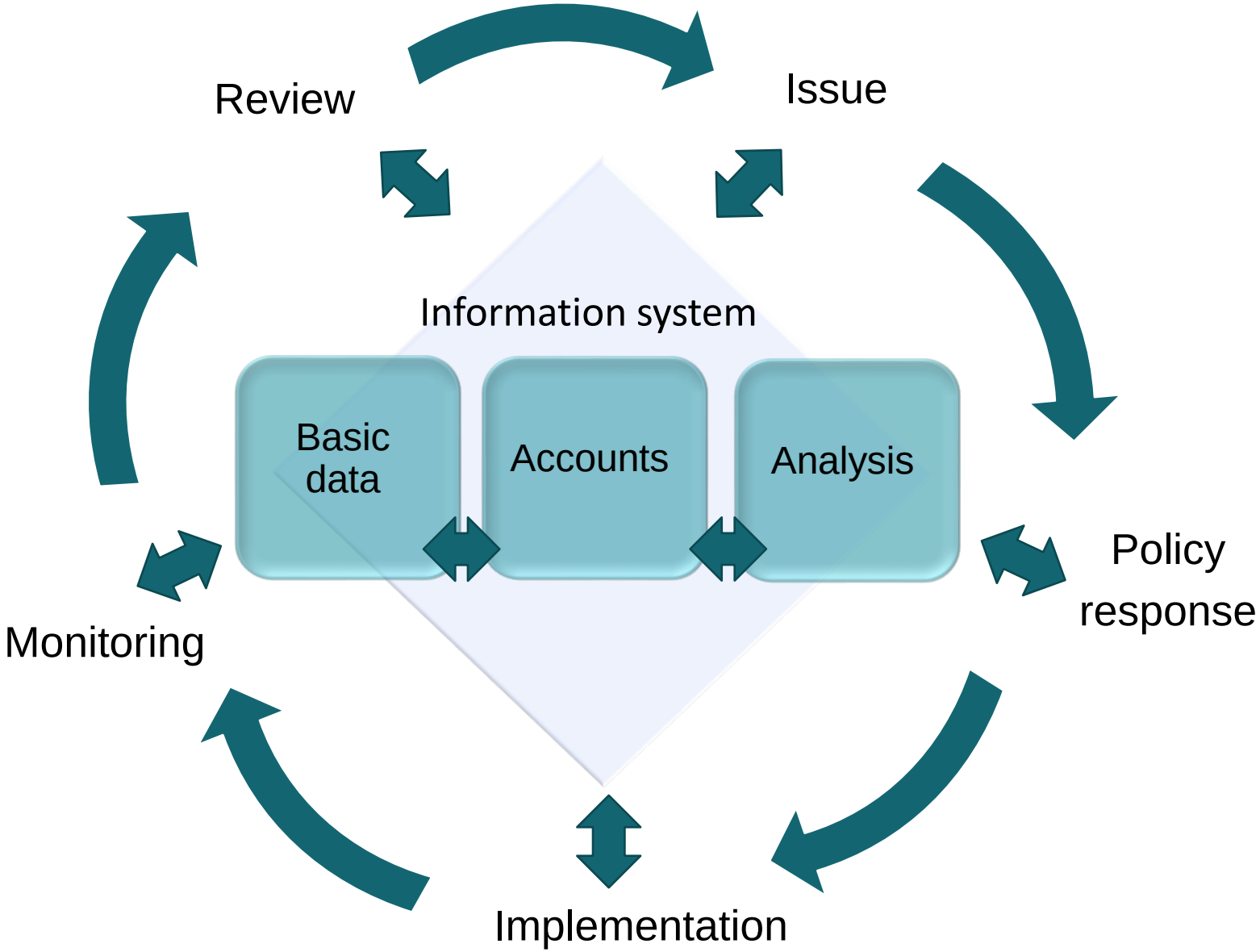
Role of Accounting

The role of statistical and accounting frameworks



Source: UN World Tourism Organization, *Measuring the Sustainability of Tourism*

Linking accounts and decision making processes



Source: Vardon et al 2016

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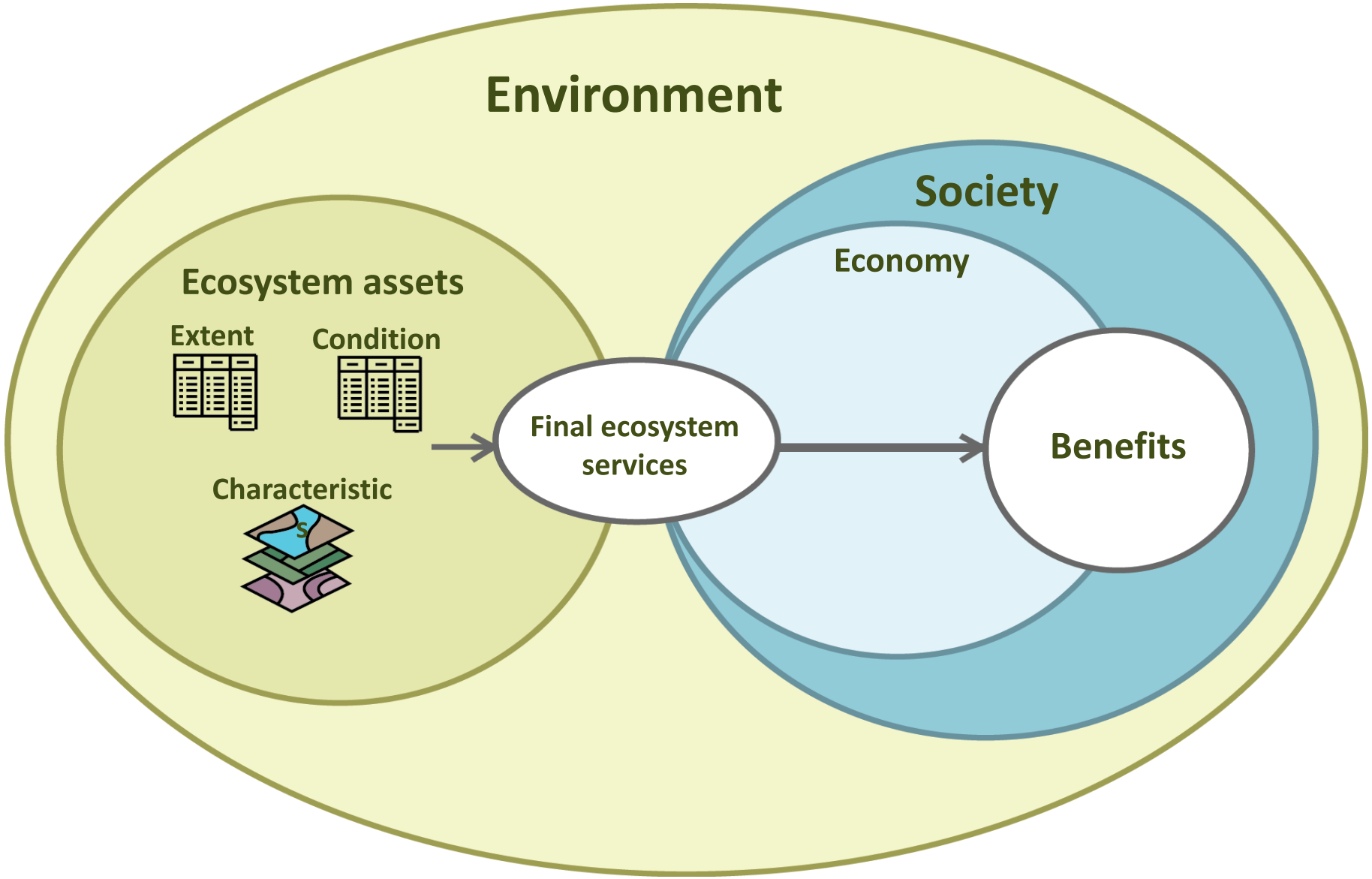
Questions and discussion

3. Focus on Ecosystem Accounting

Key Ecosystem Accounting concepts

General Ecosystem Accounting Framework



Source: UN Statistics Division

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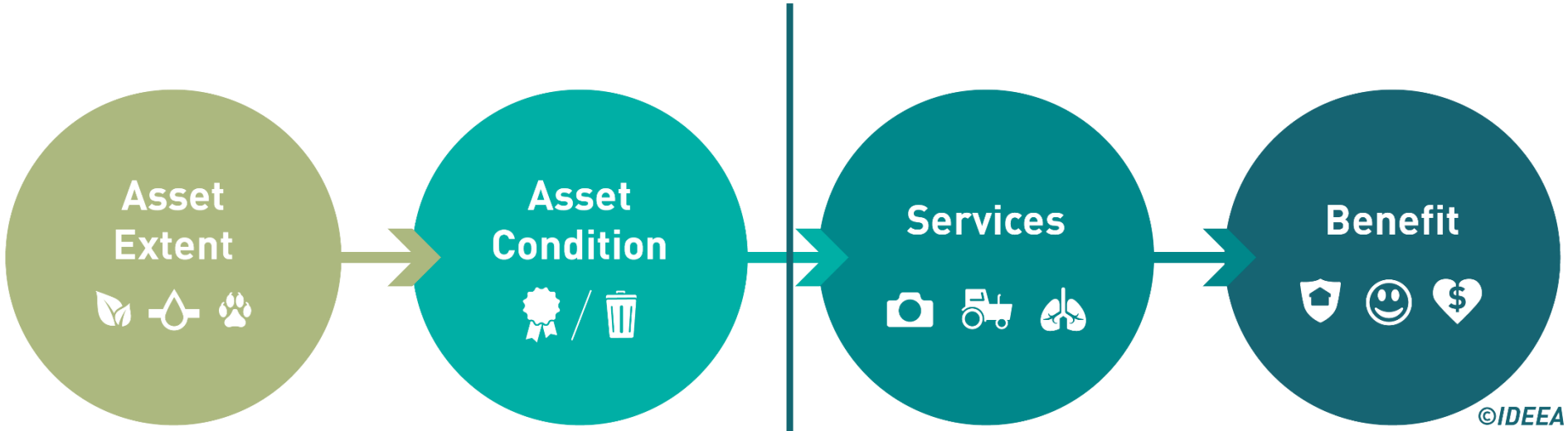
Four “box” model



Stocks

Flows

Timber (m3) Area of ecosystem assets (ha)	Tree age/density Species diversity Pests/weeds Understory density Hollow logs Burnt area Connectivity/ fragmentation	Wood provisioning Non-wood forest products (e.g. honey) Carbon sequestration and retention Water regulation and purification Soil retention Air filtration Recreation Ecosystem and species appreciation (non-use values)

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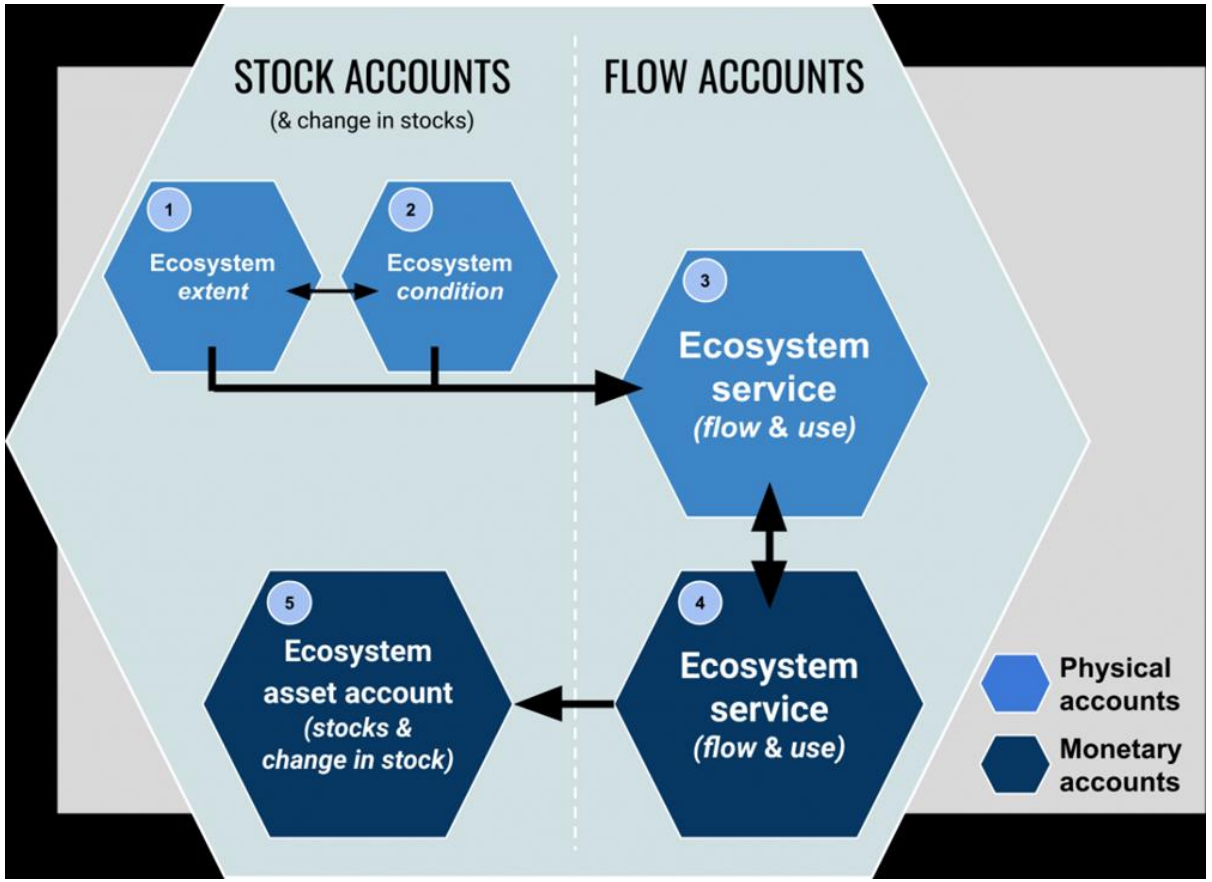
Types of ecosystem accounts



Source: SEEA Ecosystem Accounting: White cover version October 2021

- Various accounts are compiled for recording different parts of the ecosystem – economic relationship.
- A chart of accounts can be designed tailored to each context.
- Direct links can be made to standard financial data on income, costs, employment, etc.
- Monetary values for ecosystem services can be estimated and used to derive values of ecosystem assets
- Other accounts for individual stocks and flows can also be compiled
  - Carbon & GHG emissions
  - Timber
  - Water
  - Species (Biodiversity)
  - Energy

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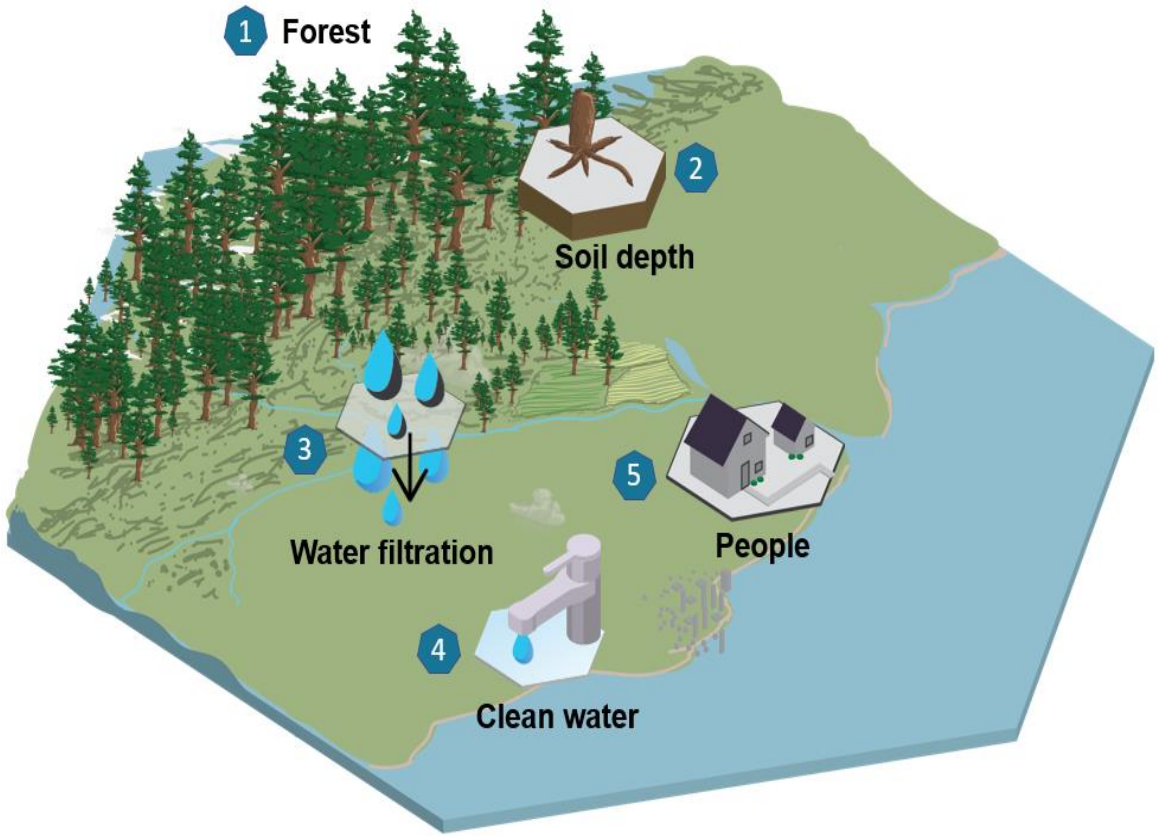
Spatial and granular

Fundamental to applying the ecosystem accounting approach is work at fine spatial scales

Each ecosystem is treated as a distinct asset with a location, extent and condition.

Depending on context and data availability can distinguish, for example, coupes, species (hardwood and softwood), roads, grassland, wetland, agricultural land, etc.

Data are then attributed spatially to tell a story about each asset, the services it supplies and the changes over time



Source: UN Statistics Division

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SEEA EA : Definitions

Ecosystem assets *are contiguous spaces of a specific ecosystem type characterized by a distinct set of biotic and abiotic components and their interactions*

Ecosystem accounting area (EAA) *is the geographical territory for which an ecosystem account is compiled.*

Ecosystem extent *is the size of an ecosystem asset in terms of spatial area.*

Ecosystem condition *is the quality of an ecosystem measured in terms of its abiotic and biotic characteristics.*

Ecosystem services *are the contributions of ecosystems to the benefits that are used in economic and other human activity.*

Benefits *are the goods and services that are ultimately used and enjoyed by people and society.*

(Source: SEEA Ecosystem Accounting: White cover version October 2021)

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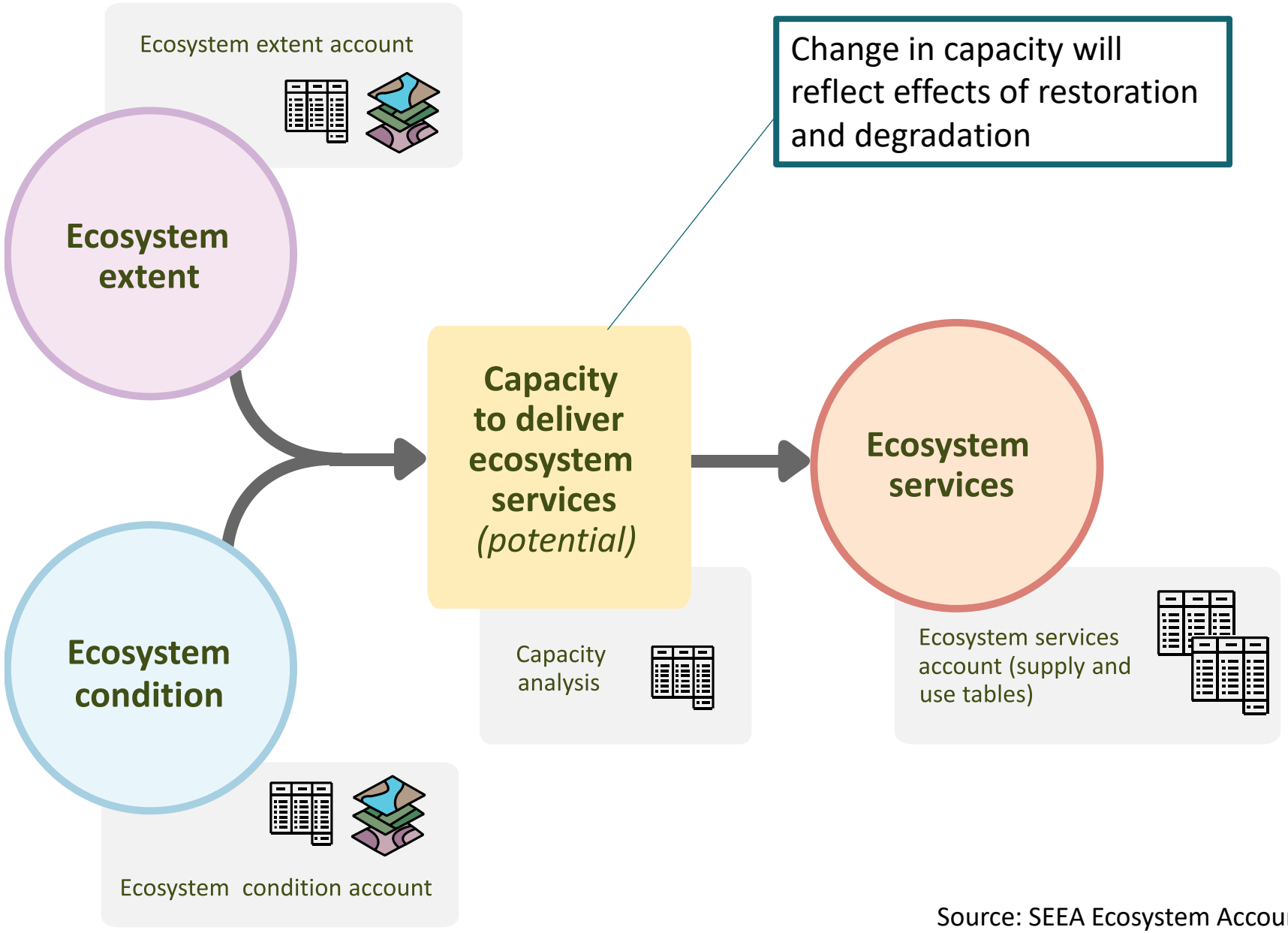
Ecosystem capacity: Entry point for productivity and resilience assessment



Source: SEEA Ecosystem Accounting: White cover version October 2021

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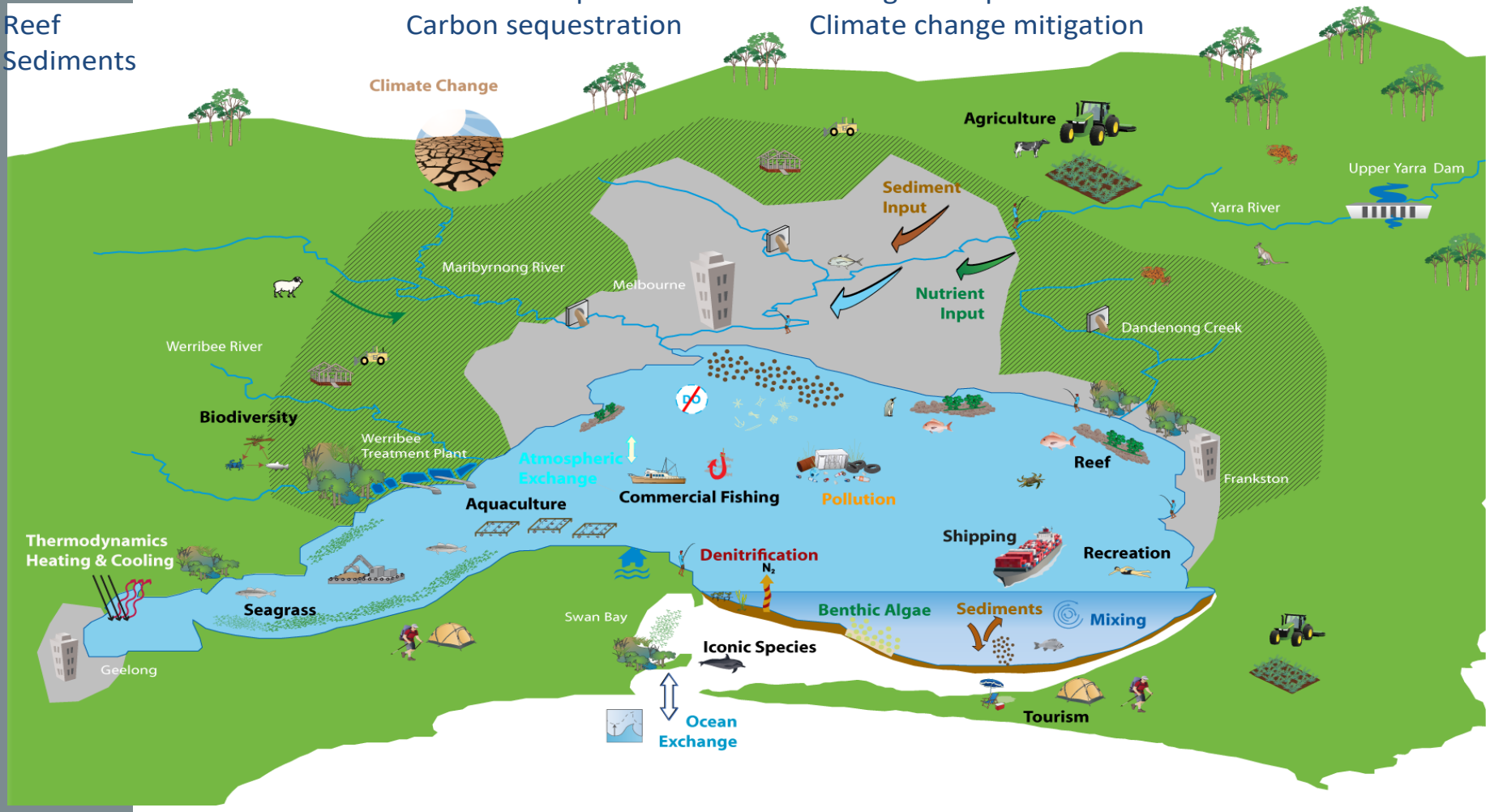
Stylised core ecosystem accounts

Port Phillip Bay (PPB) and catchment

Ecosystem assets
Seagrass
Saltmarsh
Reef
Sediments

Ecosystem services
Denitrification
Habitat and species
Carbon sequestration

Benefits
Recreation and tourism
Fishing and aquaculture
Climate change mitigation



Source: Adapted by DELWP from Environment Protection Authority (2016).

Key steps

1. Determine spatial boundary for the accounts
2. Select and map ecosystem types
3. Measure condition
4. Determine relevant ecosystem service flows in physical terms
5. Estimate prices for each ecosystem service
6. Derive net present values
7. Record changes in values over the accounting period

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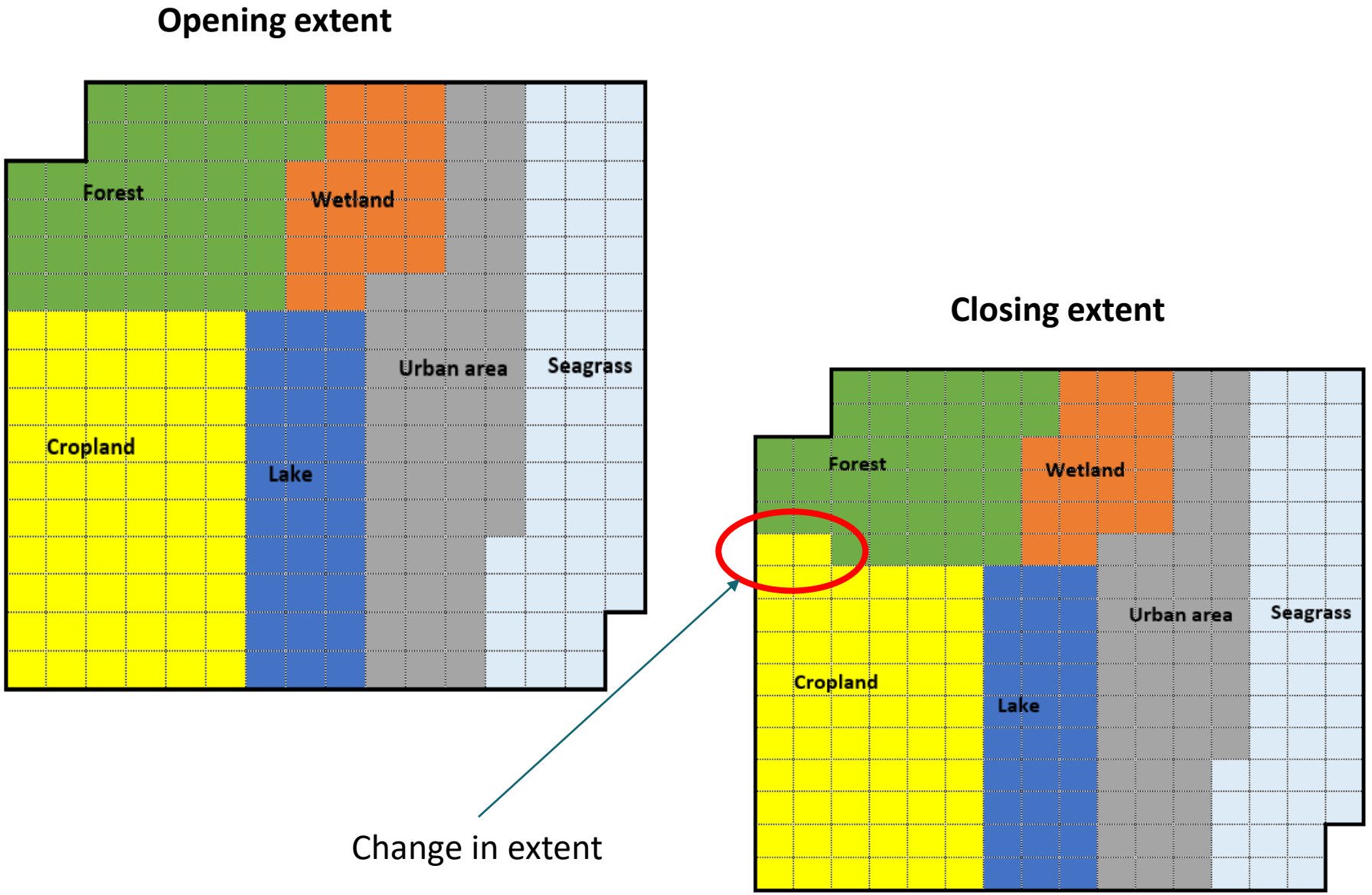
Maps of ecosystem assets by type



Source: SEEA Ecosystem Accounting: White cover version October 2021

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Ecosystem Extent Account

Accounting entries	Ecosystem types						Total
	Forest	Lake	Cropland	Urban area	Wetland	Seagrass	
Opening extent	40	30	60	50	20	50	250
Additions to extent							
Managed expansions			2				2
Unmanaged expansions							
Reduction to extent							
Managed reductions	2						2
Unmanaged reductions							
Net change in extent	-2	0	+2	0	0	0	0
Closing extent	38	30	62	50	20	50	250

Source: SEEA Ecosystem Accounting: White cover version October 2021

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Ecosystem condition account - forests

Stage 1a: Select variables

Stage 1b: Enter observed values

Stage 2: Apply reference levels

Stage 3: Weight & aggregate

SEEA Ecosystem Condition Typology Class		Variable descriptor	Measurement unit	Variable values (observed)		Reference level values		Indicator values (0 - 1)		Change in indicator (level)	Weight in aggregate index
				Opening	Closing	Lower level	Upper level	Opening	Closing		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Abiotic characteristics	Physical state	Vegetation water content - NDWI	index (-1 to 1)	0.31	0.29	-1	1	0.66	0.65	-0.01	0.17
	Chemical state	Soil organic carbon stock	tC/ha	100	95	0	250	0.40	0.38	-0.02	0.08
		Foliar or litter nitrogen concentration	mg N / g dry weight	18	17	4	40	0.39	0.36	-0.03	0.08
	Total abiotic							**0.52**	**0.51**	**-0.02**	0.33
Biotic characteristics	Compositional state	Tree species richness	number	6	5	0	10	0.60	0.50	-0.10	0.17
	Structural state	Tree cover	%	81	75	0	100	0.81	0.75	-0.06	0.17
	Functional state	Vegetation index - NDVI	index (-1 to 1)	0.65	0.63	-1	1	0.83	0.82	-0.01	0.17
	Total biotic							**0.75**	**0.69**	**-0.06**	0.50
Landscape/waterscape characteristics		Forest area density	%	74	59	0	100	**0.74**	**0.59**	**-0.15**	0.17
	Total landscape/waterscape							**0.74**	**0.59**	**-0.15**	
Total								**0.67**	**0.60**	**-0.07**	1.00

Summary condition account

Accounting entries	Ecosystem types					
	Forest	Lake	Cropland	Urban area	Wetland	Seagrass
Opening condition value	**0.67**	**0.57**	**0.43**	**0.51**	**0.57**	**0.51**
Change in abiotic ecosystem characteristics	-0.02	0.06	-0.01	0.03	-0.06	-0.02
Change in biotic ecosystem characteristics	-0.06	0.05	0.01	-0.06	-0.01	-0.06
Change in landscape level characteristics	-0.15	0.00	-0.01	-0.04	-0.06	-0.12
Net change in condition	-0.07	0.04	0.00	-0.02	-0.04	-0.07
Closing condition value	**0.60**	**0.61**	**0.43**	**0.49**	**0.52**	**0.44**

Source: SEEA Ecosystem Accounting: White cover version October 2021

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Ecosystem services – Logic chains

Example for Air filtration services

Ecosystem type/s	Factors determining supply		Factors determining use	Ecosystem Service		Benefit	Users
	Ecological	Human		Description	Physical metric/s		
Mainly forest and woodland	Type and condition of vegetation; Ambient pollutant concentrations	Ecosystem management Release of air pollutants	Behavioural responses and location of people and buildings affected by pollution	Air filtration services (air pollutant mediation)	Tonnes of pollutants absorbed by type of pollutant (e.g., PM10; PM2.5)	Reduced concentrations of air pollutants (non-SNA benefit)	Households, Businesses, Governments

Source: SEEA Ecosystem Accounting: Global Consultation version October 2020

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Basic ecosystem service supply and use table

	Unit of measure	Economic unit (selected)			Ecosystem asset (selected types)		
		Farmer	Government	Households	Forest	Farmland	Grassland
SUPPLY							
ES #1: Biomass provisioning services (rice)	Tonnes					100	
ES #2: Air filtration services (PM2.5)	Tonnes				50		
USE							
ES #1: Biomass provisioning services (rice)	Tonnes	100					
ES #2: Air filtration services (PM2.5)	Tonnes			50			

Source: SEEA Ecosystem Accounting: White cover version October 2021

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Accounting in monetary terms

Key points:

- Ecosystem accounts can be presented in monetary terms including supply and use tables and asset accounts
- Central concept is exchange values to align with the SNA. Exchange values are *"the values at which goods, services, labour or assets are in fact exchanged or else could be exchanged for cash" (SNA 2008)*
- The 'prices' for ecosystem services are not generally observable in markets. Therefore a range of non-market valuation techniques needs to be used
- Concept applied in ecosystem accounting using methods to estimate prices as if a market existed – revealed preference methods
- A price for each ecosystem service is derived and multiplied by the relevant quantity to provide an estimated transaction value
- The monetary value of ecosystem assets is derived as the Net Present Value of future ecosystem service flows

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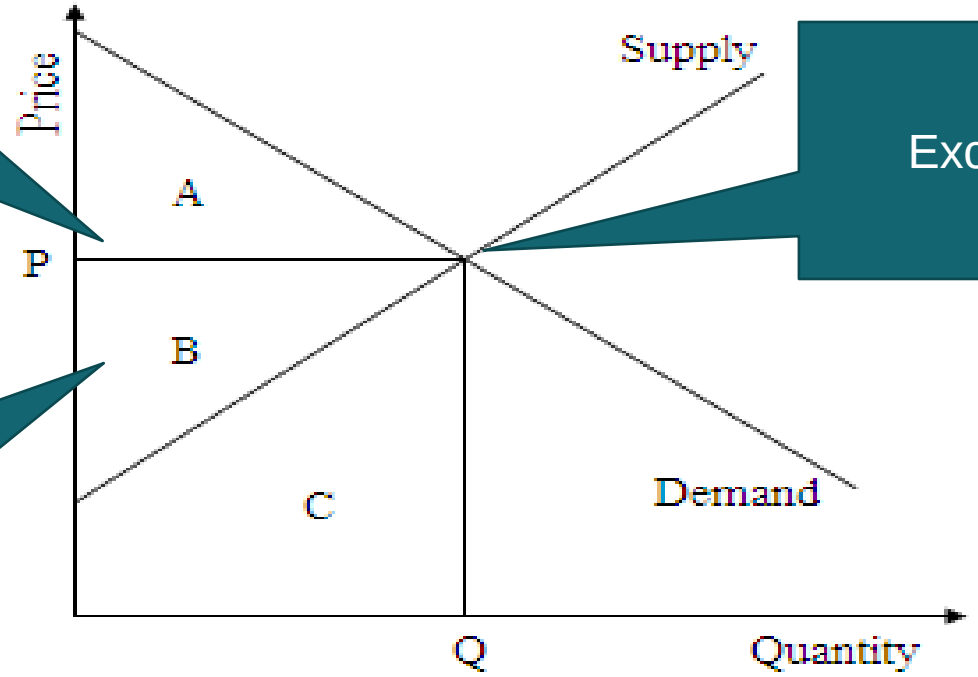
Exchange values and welfare values

Consumer surplus

Producer surplus



Exchange value

Producer surplus + consumer surplus
= Welfare value

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Assumed ES prices to derive exchange values

Type of Ecosystem Service	Price per unit
Wood provisioning	\$60 / m^3
Crop provisioning	\$75 / tonne
Wild fish biomass provisioning	\$350 / tonne
Global climate regulation	\$25 / tonne of CO_2
Water purification	\$100 / tonne of N removed
Recreation-related	\$5 / visit

Net present value calculations for forests

Forest		Opening value (1 January 2020)	Closing value (31 December 2020)
Expected physical flows	Wood provisioning (m^3)	150	120
	Global climate regulation (tonnes CO_2)	160	125
	Recreation-related (# visits)	1,600	1,450
Expected prices	Wood provisioning	$60	$65
	Global climate regulation	$25	$26
	Recreation-related	$5	$5
Expected exchange values	Wood provisioning	$9,000	$7,800
	Global climate regulation	$4,000	$3,250
	Recreation-related	$8,000	$7,250
	Total	**$21,000**	**$18,300**
Net present value	Wood provisioning	$387,885	$336,167
	Global climate regulation	$172,393	$140,070
	Recreation-related	$344,787	$312,463
	Total	**$905,065**	**$788,700**
Change in NPV			**-$116,366**

Monetary ecosystem asset account

	Forest	Lake	Wetland	Cropland	Urban area	Seagrass	TOTAL
Opening value	$4,821,413	$1,122,281	$245,661	$72,405	$571,053	$2,895,347	$9,728,160
Ecosystem enhancement	$0	$15,300	$0	$15,065	$0	$0	$30,365
Ecosystem degradation	-$573,728	$0	$0	$0	$0	-$364,181	-$937,909
Ecosystem conversions							
Additions	$0	$0	$0	$2,601	$0	$0	$2,601
Reductions	-$230,496	$0	$0	$0	$0	$0	-$230,496
Other changes in volume of							
Catastrophic losses							
Upward reappraisals	$0	$0	$0	$0	$129,295	$0	$129,295
Downwards reappraisals	$0	$0	$0	$0	$0	$0	$0
Revaluations	$145,250	$51,503	$25,859	-$3,875	$6,465	$306,429	$531,631
Net change in value	-$658,974	$66,802	$25,859	$13,791	$135,760	-$57,752	-$474,513
Closing value	$4,162,439	$1,189,084	$271,520	$86,197	$706,813	$2,837,595	$9,253,647

Source: SEEA Ecosystem Accounting: White cover version October 2021

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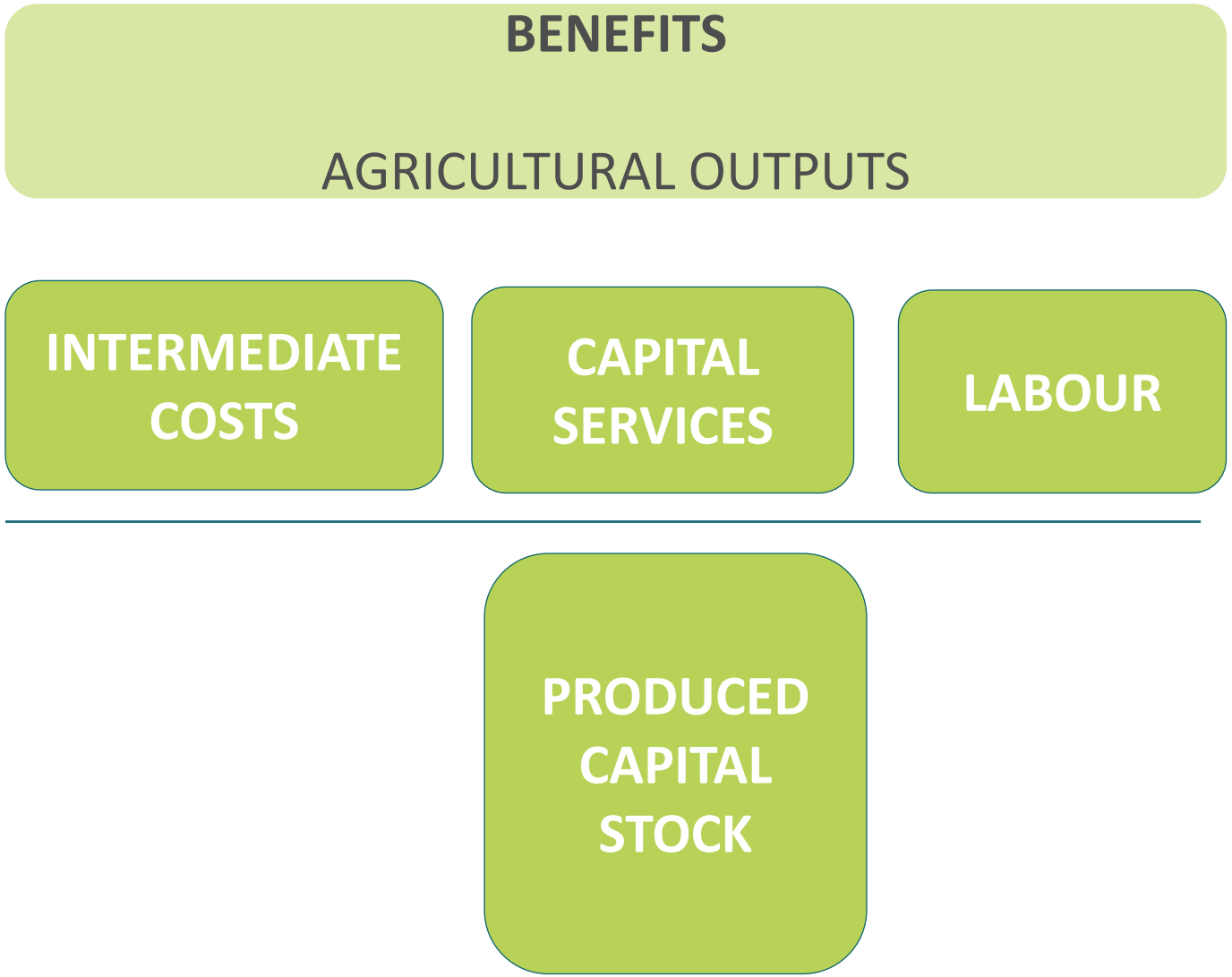
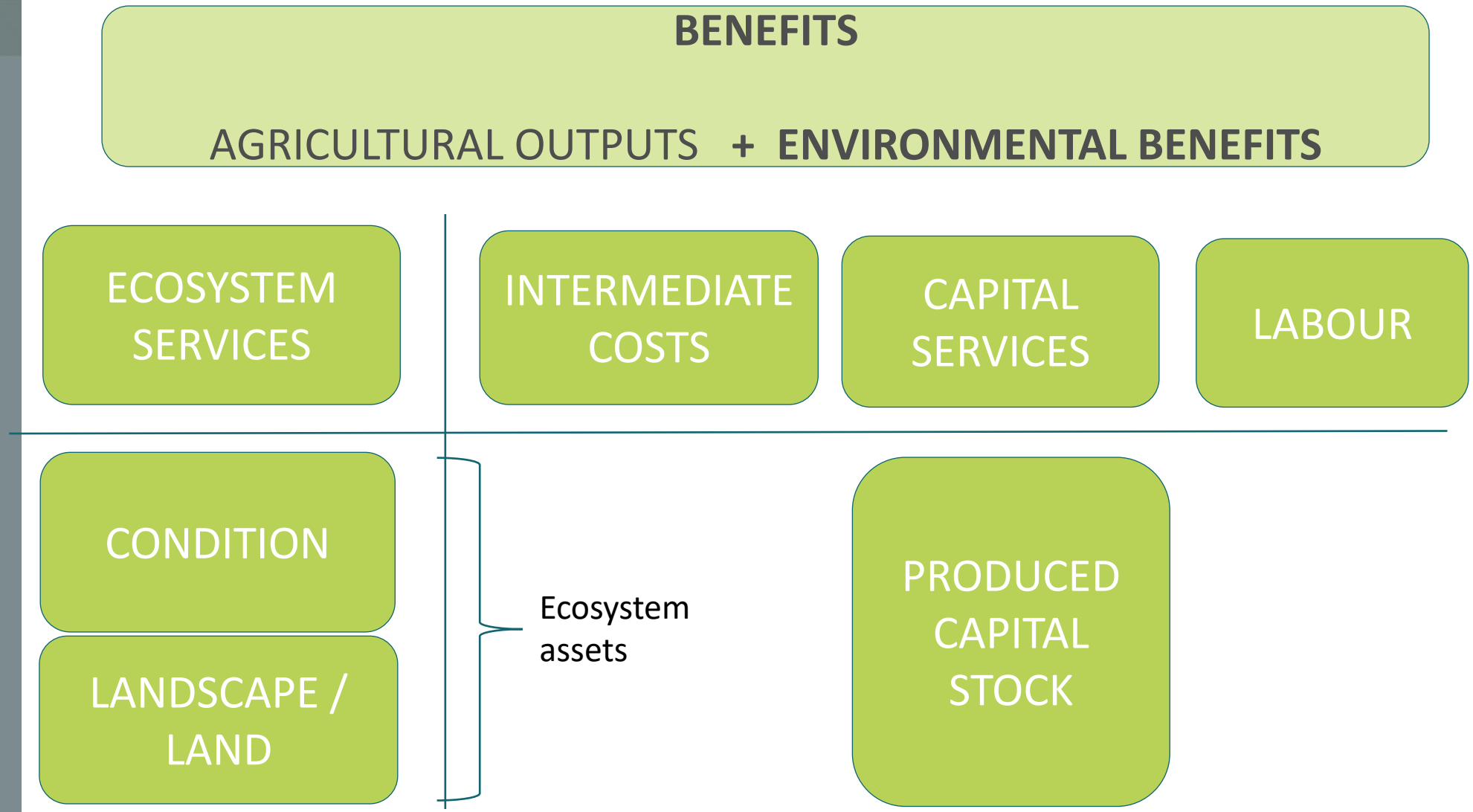
Linking Ecosystem Accounting to the SNA

Standard economic accounting - agriculture



Integrated environmental-economic accounting



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Standard Supply and Use Table

	Wheat farmer	Other industries	Household final consumption	Total
Supply table				
Wheat	800			800
Wheat products		2000		2000
Fertilizer		200		200
Other intermediate inputs		150		150
Total output (1)	800	2350		3150
Use table				
Wheat		800		800
Wheat products			2000	2000
Fertilizer	200			200
Other intermediate inputs	150			150
Total input (2)	350	800	2000	3150
Gross value added (3=1-2)	**450**	1550	na	2000

?

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SUT with Ecosystem Services to farmer

	Wheat farmer	Other industries	Ecosystem asset: Wheat farmland	Household final consumption	Total
Supply table					
Wheat	800				800
Wheat products		2000			2000
Fertilizer		200			200
Other intermediate inputs		150			150
Ecosystem services: Crop provision			**200**		200
Total output (1)	800	2350	200		3350
Use table					
Wheat		800			800
Wheat products				2000	2000
Fertilizer	200				200
Other intermediate inputs	150				150
Ecosystem services: Crop provision	**200**				200
Total input (2)	550	800	0	2000	3350
Gross value added (3=1-2)	**250**	1550	**200**	na	2000

?

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SUT with ecosystem services to society

	Wheat farmer	Other industries	Ecosystem asset: Wheat farmland	Household final consumption	Total
Supply table					
Wheat	800				800
Wheat products		2000			2000
Fertilizer		200			200
Other intermediate inputs		150			150
Ecosystem services: Crop provision			**200**		200
Ecosystem services: Climate regulation			**100**		100
Total output (1)	800	2350	300		3450
Use table					
Wheat		800			800
Wheat products				2000	2000
Fertilizer	200				200
Other intermediate inputs	150				150
Ecosystem services: Crop provision	**200**				200
Ecosystem services: Climate regulation				**100**	100
Total input (2)	550	800	0	2100	3450
Gross value added (3=1-2)	**250**	1550	**300**	na	**2100**

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Accounting for stocks of capital

Capital accounting theory

Key aspects:

- Theory developed through 1950s and 60s and progressively refined
  - Solow, Jorgenson, Griliches, Diewert, etc
- Recognition of capital as providing input to production via capital services
- Recognition that this input will decline over time due to depreciation of stock and quality of the asset
  - Depreciation profiles; asset lives
  - Net capital stock; Productive capital stock
  - Index number theory
  - Growth accounting approach to productivity

Application to national accounts

Key aspects:

- Measures of capital stock and productivity progressively developed through the 1980s & 1990s
- Application of the perpetual inventory model (PIM)
  - Estimates based on time series of investment data by asset type (gross fixed capital formation) and lots of assumptions
  - Same information base used to derive productive capital stock
- Ownership not critical except to the extent that the investment is recognized only if associated benefits/income is within the production boundary – i.e. the capital needs a user

Extension to natural resources

Key aspects

- Ongoing development of wealth accounting from the 1970s onwards (e.g. Dasgupta, Maler, Arrow, Pearce, etc)
- SEEA Central Framework codifies accounting for natural resources (renewable and non-renewable) based on resource rents and net present value (NPV)
- Schreyer and Obst (Annex 5.1 & 2014) clarify the full decomposition of the change in NPV following capital accounting and index number principles
- Depletion defined related to change in the quantity of the stock
- Fenichel & Abbott (2014 and later work) formally extend the Jorgenson capital accounting framework

The challenge with ecosystems

Key challenges

- How to recognize the cost of using up natural capital when it changes in quality (e.g. loss of biodiversity) – degradation
- Incorporation multiple benefits – i.e. those outside of the production boundary
- Incorporation of multiple users for a single asset
- No direct links to market values
- Taking into account spatial variation of ecosystems and their links to people

Initial progress

- Barbier (2013) describes the potential in the context of wealth accounting
- More recently highlighted in Dasgupta (2021) wrt biodiversity
- SEEA EEA (2013) described similar approach with alignment to SNA principles concerning changes in assets

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State of play and ongoing questions

Key points:

- Accept and highlight that SEEA EA does not provide a complete value of nature and does not intend to do so
- A focus on biophysical stocks and changes is essential, especially concerning asset values requiring an understanding of future flows
- The distinction between exchange and welfare values has been largely worked through – both valuation concepts will be relevant depending on the analytical question and SEEA EA data will be relevant in measurement of both
- There remains significant concern among some national accountants about the techniques proposed to estimate exchange values and the extent to which the concept of exchange values can be applied wrt ecosystems and ecosystem services
- Much work is needed to expand the data sets available to estimate non-monetary transactions in ecosystem services and improving the coverage and quality of these data
- More work is needed to enhance the estimation of future flows of ecosystem services, especially wrt linking ecosystem condition and ecosystem asset values

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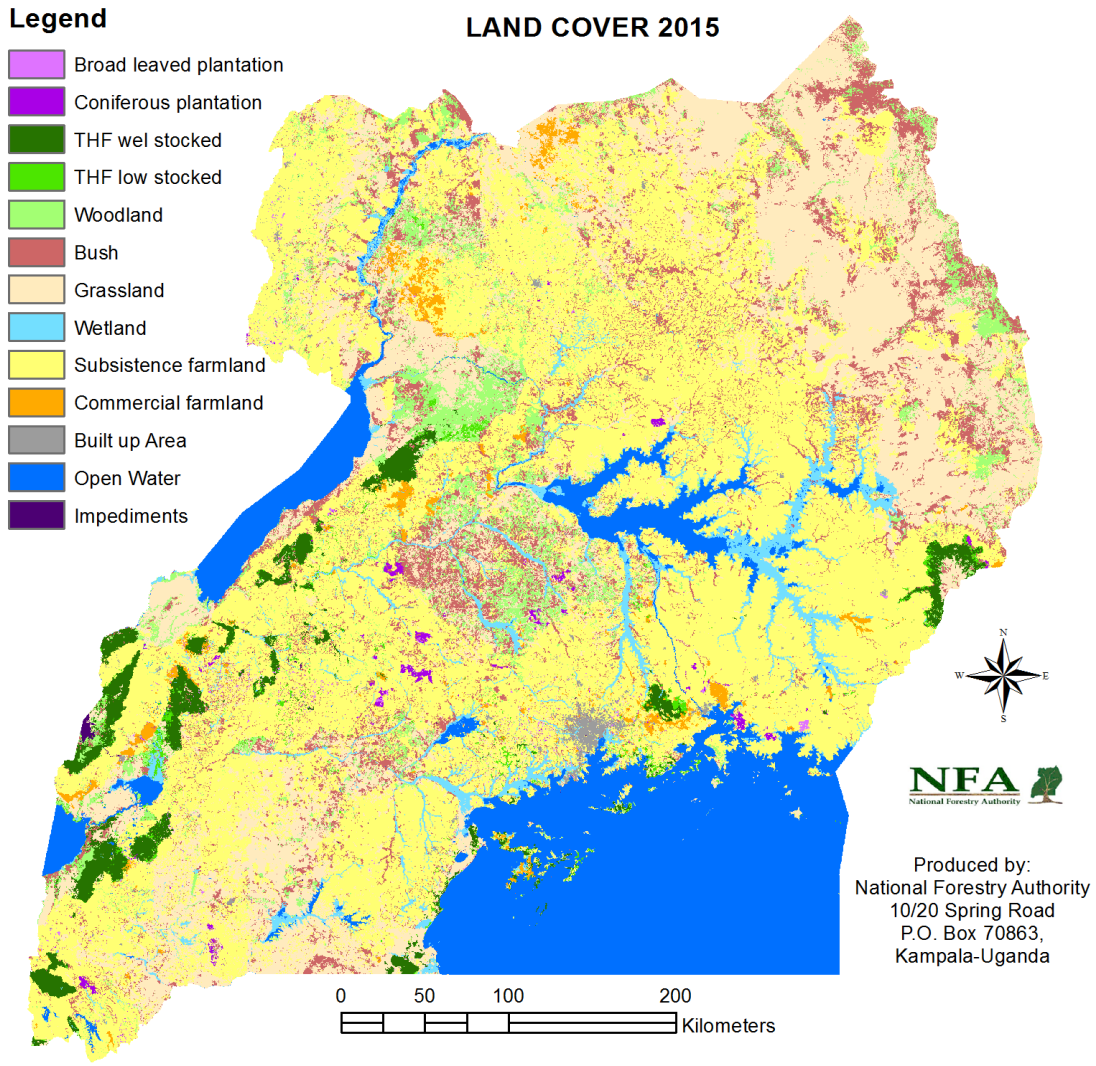
Applying the SEEA: The case of Uganda

UNEP-WCMC led project

https://www.unep-wcmc.org/featured-projects/nca-in-uganda

Extent accounts

Uganda ecosystem extent based on land cover



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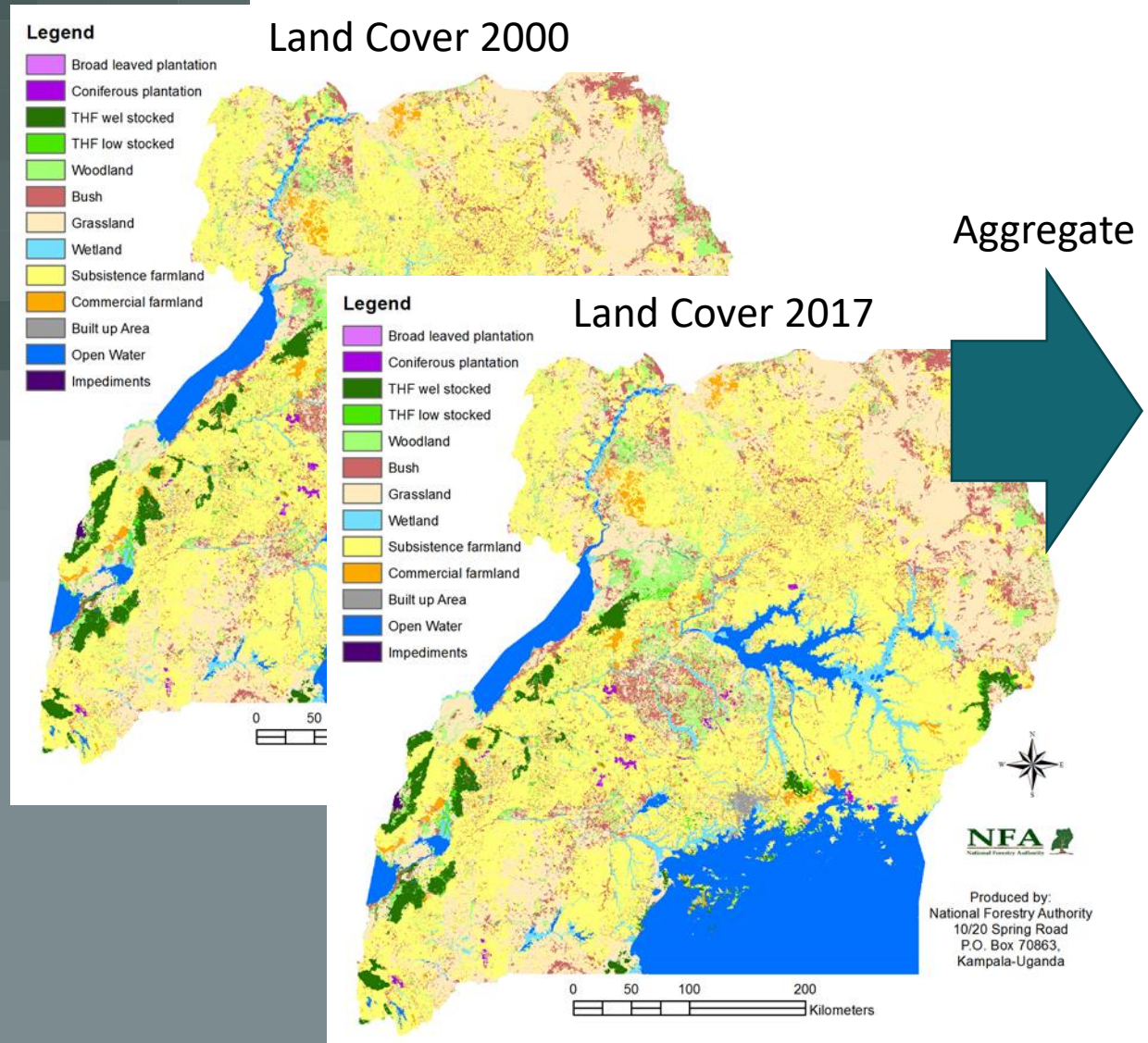
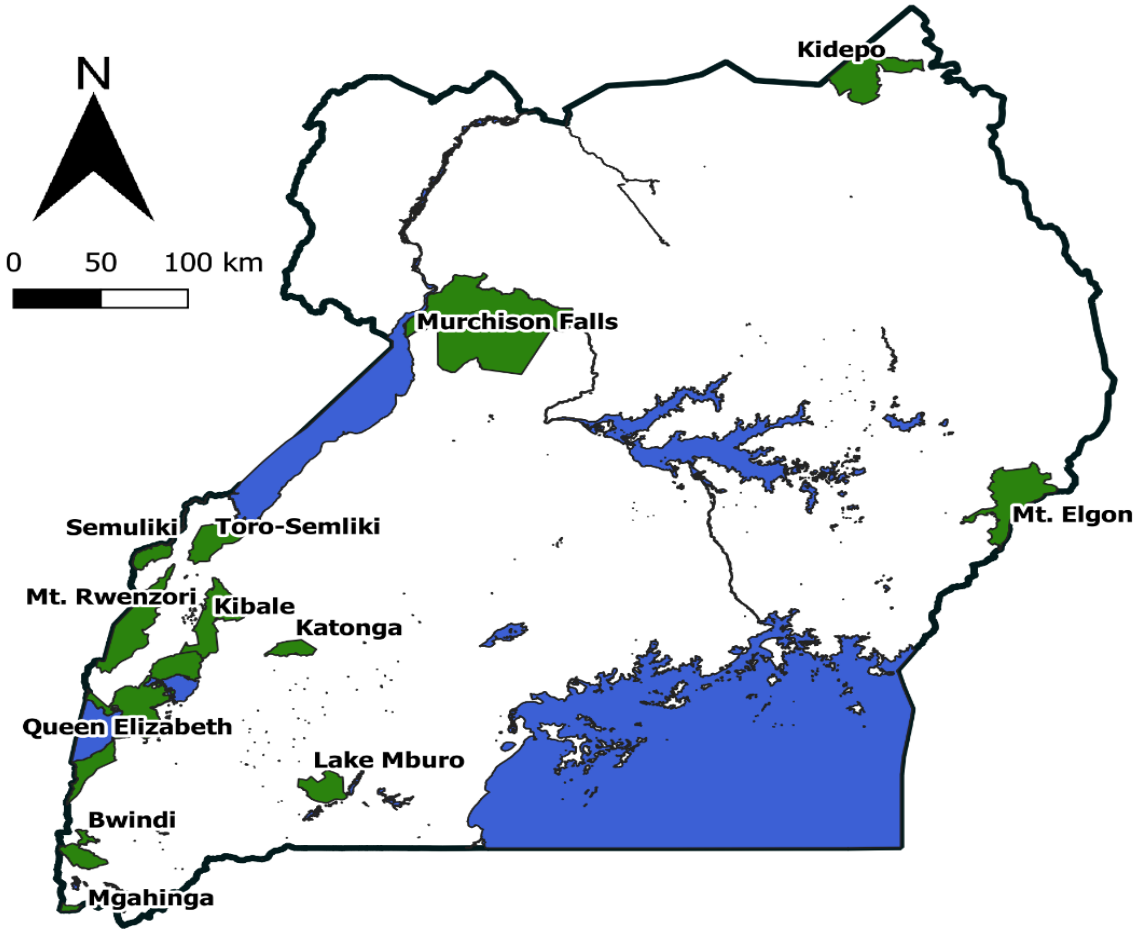
Natural Ecosystem Extent



NBS Class	Ecosystem Type
Tropical forest well stocked	Tropical forest well stocked (Natural)
Tropical forest low stocked	Tropical forest low stocked (Natural but degraded with secondary growth)
Woodland	Woodland (Natural)
Bush	Bush (Natural)
Grassland	Grassland (Natural)
Wetland	Wetland (Natural)
Open Water	Open Water (Natural)
Broad leaved plantations	Non-natural The combined extent of these land cover classes is aggregated within the Natural Ecosystem Extent Accounts to ease presentation.
Coniferous plantation	
Small scale farmland	
Commercial farmland	
Built-up area	
Impediments (areas with no vegetation)	No data
No data (additional class for balancing small discrepancies)	

Ecosystem accounting for protected areas



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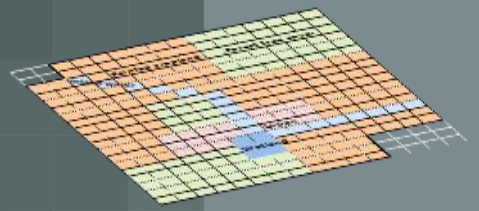
Deriving extent accounts

NBS Land Cover Maps



Ecosystem type

Spatial Analysis
Or Processing:

- EnSym (see report)
- Other GIS
- Can be part of regular physical land asset accounting work

Natural Ecosystem Extent Account	Katonga	2000 to 2017								
Classifications >>	**Tropical high forest well stocked**	**Tropical high forest low stocked**	**Woodland**	**Bush**	**Grassland**	**Wetland**	**Open-water**	**Non-natural**	**No data**	**TOTALS**
Opening Stock (ha)	-	-	13,381	5,031	1,634	520	-	475	-	21,041
Additions to stock (ha)	-	-	-	-	-	-	-	-	-	-
Total additions to stock	-	860	887	1,823	4,795	482	-	503	-	9,350
Reductions in stock (ha)	-	-	-	-	-	-	-	-	-	-
Total reductions in stock	-	-	(4,600)	(3,654)	(610)	(40)	-	(446)	-	(9,350)
Net change in stock (ha)	-	860	(3,713)	(1,831)	4,185	442	-	57	-	-
Closing Stock (ha)	-	860	9,668	3,200	5,819	962	-	532	-	21,041

Internally Consistent

* Non-natural = Broad leaved plantations, Coniferous plantation, Small scale farmland, Commercial farmland, Built-up area

No data = Impediments, No data

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Monetary SNA Goods and Services Accounts, All 12 Protected Areas, 2019

Different SNA Goods and Services produced an consumed during wildlife watching tourism visits to 12 key protected areas

Different Economic units producing SNA Goods & Services consumed during visits

Different types of tourists consuming SNA Goods & Services consumed during visits

Classifications >>	Producers			Consumers					
	Type of Economic Unit			Type of Consumer					
	Government (UWA run National Parks)	Businesses (Private operators)	TOTAL USED	Foreign Non Residents (International Visitors)	Foreign Residents (Domestic Visitors)	EAC Visitors	Students (Domestic Visitors)	Unallocated	TOTAL CONSUMED
SNA Supply Products & Services (2019, Ush. '000s)									
Park entrance	25,699,681	-	25,699,681						
Vehicle entrance	789,876	-	789,876						
Gorilla tracking	71,913,644	-	71,913,644						
Other recreational activities	15,366,212	-	15,366,212						
Hotels, bars and restaurants (International)	493,069	41,013,200	41,506,268						
Retail trade (International)	-	10,206,409	10,206,409						
Travel services (International)	-	14,629,289	14,629,289						
Other services (International)	-	7,484,803	7,484,803						
TOTAL	114,262,481	73,333,700	187,596,181						
SNA Use Products & Services (2019, Ush. '000s)									
Park entrance				22,738,452	1,258,780	1,501,950	200,499		25,699,681
Vehicle entrance				-	-	-	-	789,876	789,876
Gorilla tracking				-	-	-	-	71,913,644	71,913,644
Other recreational activities				-	-	-	-	15,366,212	15,366,212
Hotels, bars and restaurants (International)				41,506,268	-	-	-	-	41,506,268
Retail trade (International)				10,206,409	-	-	-	-	10,206,409
Travel services (International)				14,629,289	-	-	-	-	14,629,289
Other services (International)				7,484,803	-	-	-	-	7,484,803
TOTAL				96,565,221	1,258,780	1,501,950	200,499	88,069,731	187,596,181

"-" Means No data available; *Unallocated means the expenditure cannot be assigned to a tourist type

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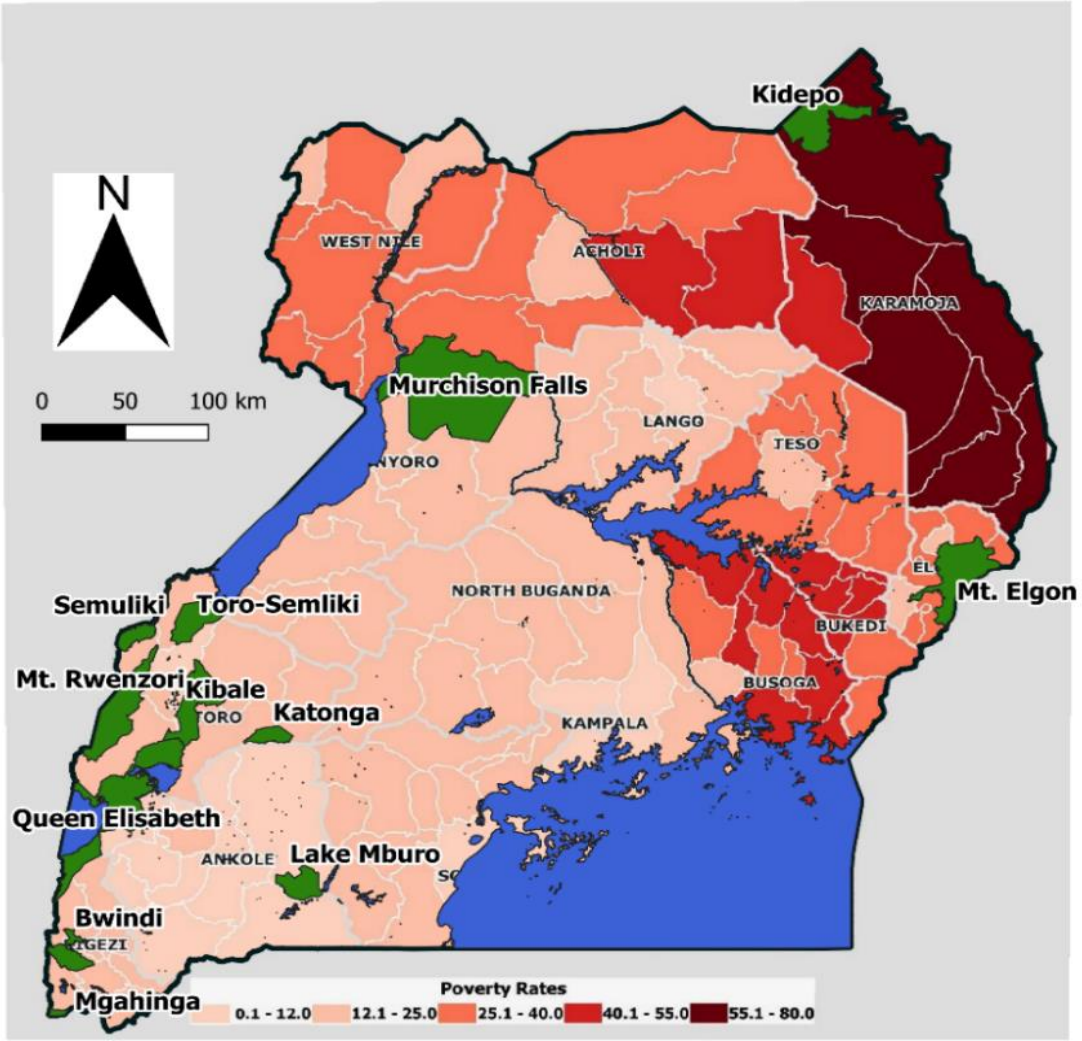
Integrating Poverty Data

Poverty maps can be broadly aligned to the information from the biodiversity and tourism accounts.

Support an integrated analysis on where tourism development may deliver policy alleviation.

Darker red districts indicate higher poverty rates

Developing tourism in Kidepo Valley National Park could be a priority.



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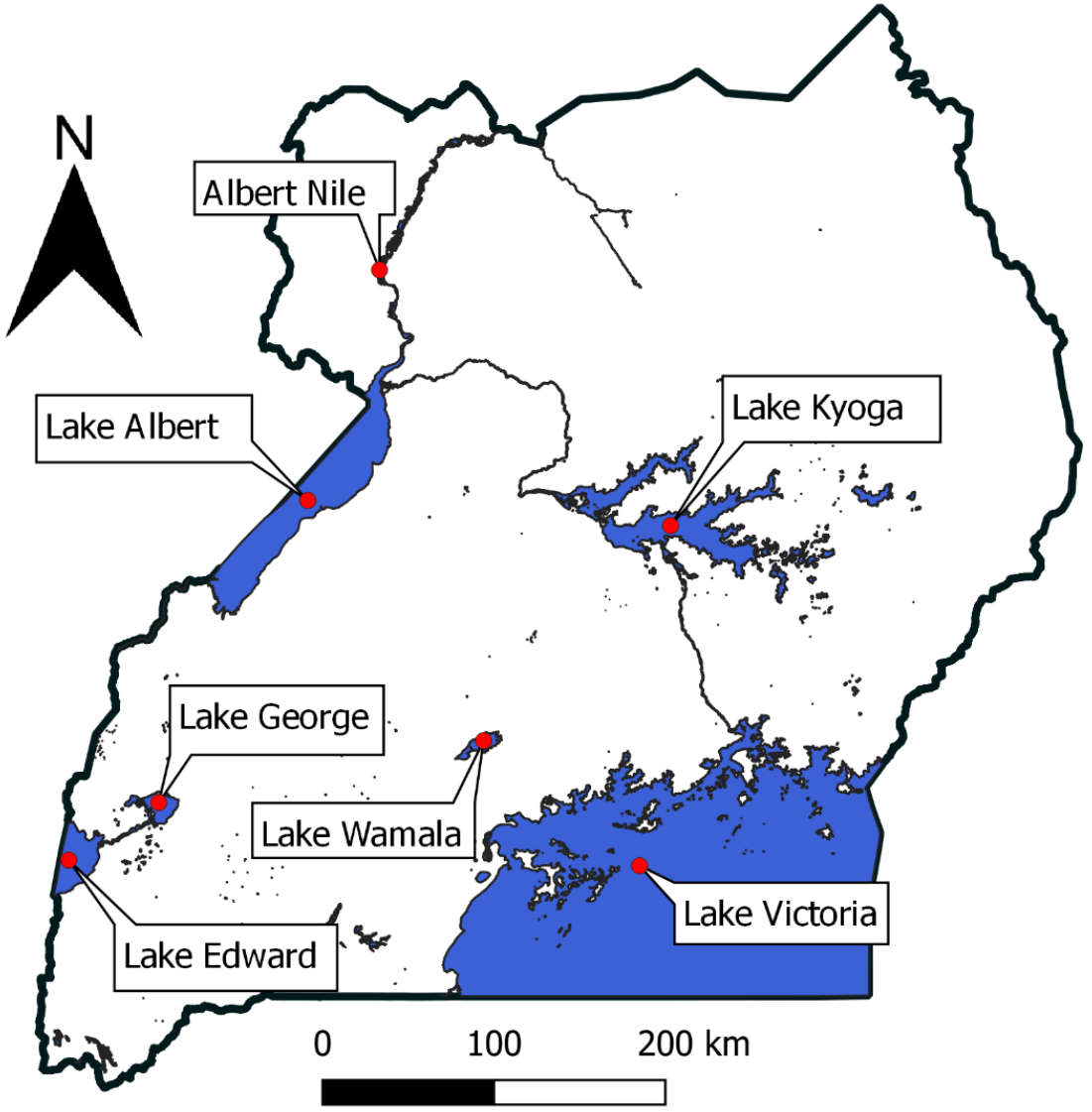
Ecosystem Accounting Areas for fisheries

Ecosystem Accounts will often be produced at the national scale

More analytical value may be added when compiling accounts for sub-national 'Ecosystem Accounting Areas'

For Fisheries, these 7 capture fisheries are the focus.



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Lake Victoria Ecosystem Condition Account

Year	Abiotic ecosystem condition indicators			Invasive weed coverage (ha)		Fish Breading Areas	
	Temperature (°C)	Dissolved oxygen (mg-l)	Turbidity-Secchi (m)	Water hyacinth (ha)	Kariba weed (ha)	Identified	Gazetted
2009	25.09	8.30	2.80	ND	ND	ND	N/A
2011	24.58	7.88	2.70	ND	ND	ND	N/A
2012	ND	ND	ND	200	ND	ND	N/A
2013	ND	ND	ND	ND	ND	147	0
2015	24.12	6.06	1.80	ND	ND	ND	N/A
2016	24.67	7.19	2.82	ND	ND	ND	N/A
2018	24.66	7.54	2.29	ND	ND	ND	N/A

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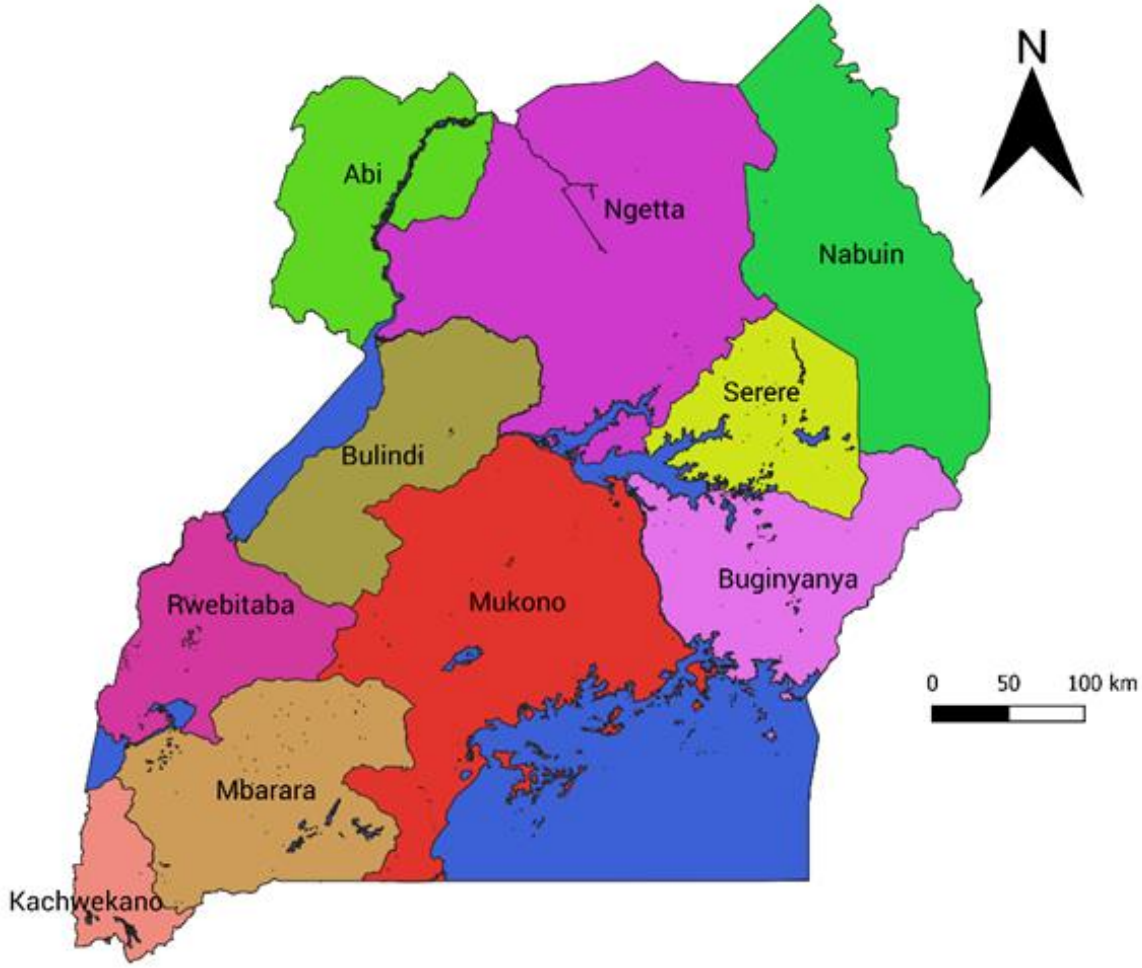
Ecosystem accounting for agricultural areas

Ugandan Zonal Agricultural Research and Development Institute (ZARDI) areas



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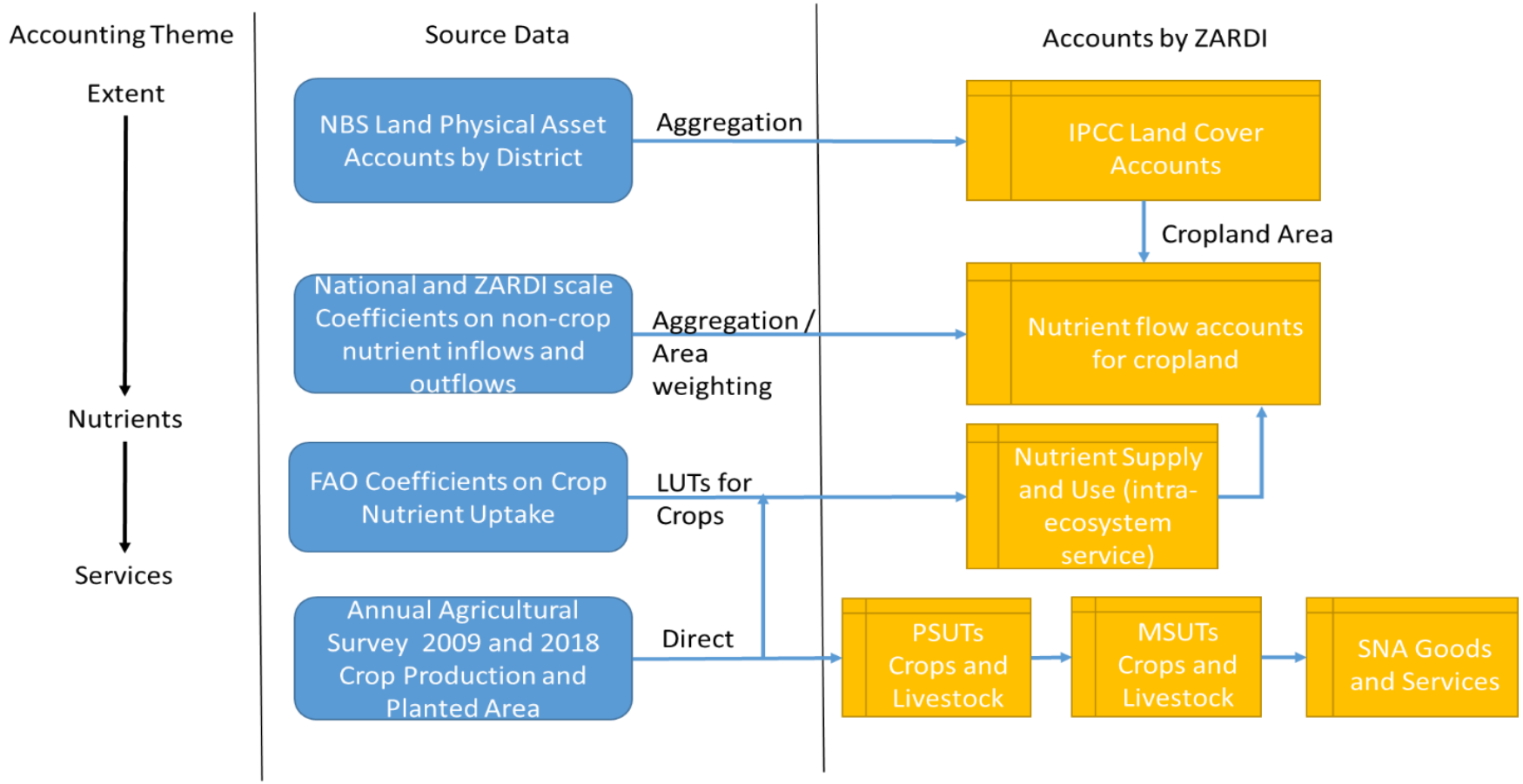
Agricultural data sources and accounts



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Questions and discussion

4. Linking SEEA to the SNA revision

Environmental sustainability in the SNA 2025

The SNA has long been criticized for not dealing well with the topics of wellbeing and sustainability

The SNA2025 will include 3 new chapters highlighting these topics – Chapter 2, Chapter 34 and Chapter 35

Key messages

- There are a range of data within the core SNA that are relevant
- The use of net measures deducting the cost of natural capital are to be highlighted
- Connecting the SNA to a range of complementary frameworks, including the SEEA, adds significant value to decision making and analysis
- The measurement of environmental sustainability applying the concepts and treatments of the SEEA will be a key feature in the new chapters

Processes ongoing to develop materials, resolve some measurement challenges and debates and finalize recommendations

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Measurement issues on environmental sustainability – adjusting GDP for depletion

Key proposal for the new SNA is adjusting measures of value added for the cost of using up natural resources in the generation of income – i.e. adjusting GVA and GDP for depletion.

Long standing proposal, embodied in SEEA Central Framework. Relevant issues being discussed include:

- Allocation of resource value and associated depletion across joint beneficiaries (e.g. mining companies and governments) - propose a “split asset” approach prioritizing economic rather than legal ownership
- Reliability of measures using NPV
- Implications for national reporting and messaging of economic performance

Measurement issues on environmental sustainability – recording biological resources

Review of the SNA 2008 in relation to biological resources (e.g. timber, fish) indicate various (unintentional) inconsistencies across chapters that, when examined directly require clarification.

The issues lie in four main areas

- Whether the SNA asset boundary should include assets of no monetary value
- Distinguishing cultivated (produced) and natural (non-produced) biological resources
- Treatment of permits or rights to access resources and the potential for rents to be across more than one beneficiary (split asset)
- Measurement of depletion where growth of the asset occurs without human intervention

Measurement issues on environmental sustainability – recording renewable energy resources

The generation of energy from renewable sources is accepted as critical in the response to climate change. The output of energy and associated operating surplus is clearly recorded in the SNA.

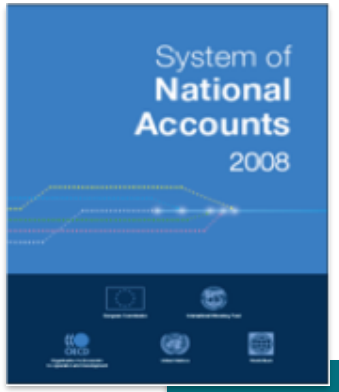
This issue concerns whether there is a return to natural capital (rent) embodied in this operating surplus which in turn generates an asset in terms of future income streams to be included on the balance sheet.

There is support for this proposal but some questions as to:

- The nature of the underlying natural capital (wind, solar energy) – what is the asset? Is the rent attributable to land, produced assets (e.g. solar panels) or is it a new asset?
- The boundary for measurement – is the potential to generate income from a location sufficient?
- The application of ecosystem accounting principles to explain the treatment – where renewable energy is an abiotic flow

5. Final observations

The accounting family

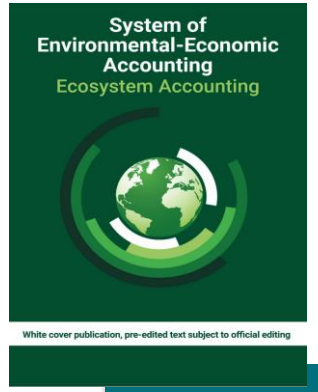


System of National Accounts

- Monetary measures
- Asset and production boundaries set by economics
- Production defined as being capable of being sold in markets
- Assets defined as being owned and capable of being used for economic gain

SEEA Central Framework

- Physical quantity measures added to monetary measures
- Asset boundary expanded
- Assets no longer have to be owned or capable of being used for economic gain



SEEA Ecosystems

- Physical quality (or condition) measures added
- Production boundary extended
- Production from ecosystems recognized and does not need to be sold in markets

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Benefits of using accounting

- Common language across agencies, disciplines and sectors
- Support presentation of a coherent and comparable sustainability story across applications
- Allow for data re-use, improved data management and reduced costs and streamline the potential to include new data sources
- Increase opportunities to verify data and enhance data quality – credibility and authority of data
- Comparability and common description of systems from local and community scales to national and global scales

What is needed?

- Recognise the **potential of accounting** to reduce the information challenge
- Invest **beyond pilot applications** towards endorsed national programs of work that build progressively and build capacity
- Using accounting-based data in **multiple applications** – accounts are not the end goal
- Work across the public sector, private sector and NGOs to create a **global accountability framework**

THANK YOU

Further reading

ABS Australian National Accounts: National Income, Expenditure and Product methodology

UN et al 2010. System of National Accounts, 2008 (SNA). http://unstats.un.org/unsd/publication/seriesf/SeriesF_2Rev5e.pdf

Coyle, D. (2014) GDP : A Brief but Affectionate History. Princeton University Press.

UN et al (2014) System of Environmental-Economic Accounting – Central Framework 2012 https://seea.un.org/content/seea-central-framework

UN et al (2021) System of Environmental-Economic Accounting – Ecosystem Accounting https://seea.un.org/ecosystem-accounting

SNA 2025 revision papers on Wellbeing and Sustainability

https://unstats.un.org/unsd/nationalaccount/snaupdate/wstt.asp

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Acknowledgements

The content and figures presented in this course come from a range of sources and reflect work and ideas generated by the community of SEEA experts over many years. The relevant sources include work by UN Statistics Division, World Bank, Eurostat, Australian Bureau of Statistics, Statistics Netherlands, UK DEFRA, Statistics Canada, ANU, University of Wageningen and IDEEA Group, recognising this is not an exhaustive list.

The presenters of this course acknowledge the significant contributions from all SEEA experts in the development of the current body of knowledge.

IDEEA Group

About IDEEA Group

IDEEA Group is a Melbourne-based firm with a team of expert economists, environmental accountants, and national accountants. The team brings together expertise in a range of disciplines including environmental markets, the design and implementation of measurement frameworks, environmental valuation, spatial analytics, sustainability, and risk management. IDEEA Group operate at the nexus of economics, ecology and accounting and realise the importance of employing a multi-disciplinary approach to solve complex problems.

IDEEA Group are world renowned experts in the development and production of environmental-economic accounts using the United Nations' System of Environmental-Economic Accounting (SEEA). IDEEA Group Principals have over 20 years of experience in natural capital thinking and are at the leading edge of conceptual and practical advances in ecosystem accounting.

Institute for Development of Environmental-Economic Accounting

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