



System of  
Environmental  
Economic  
Accounting

# Ecosystem services flow accounts in the SEEA Ecosystem Accounting

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Jakarta, Indonesia

Sokol Vako (SIAP)

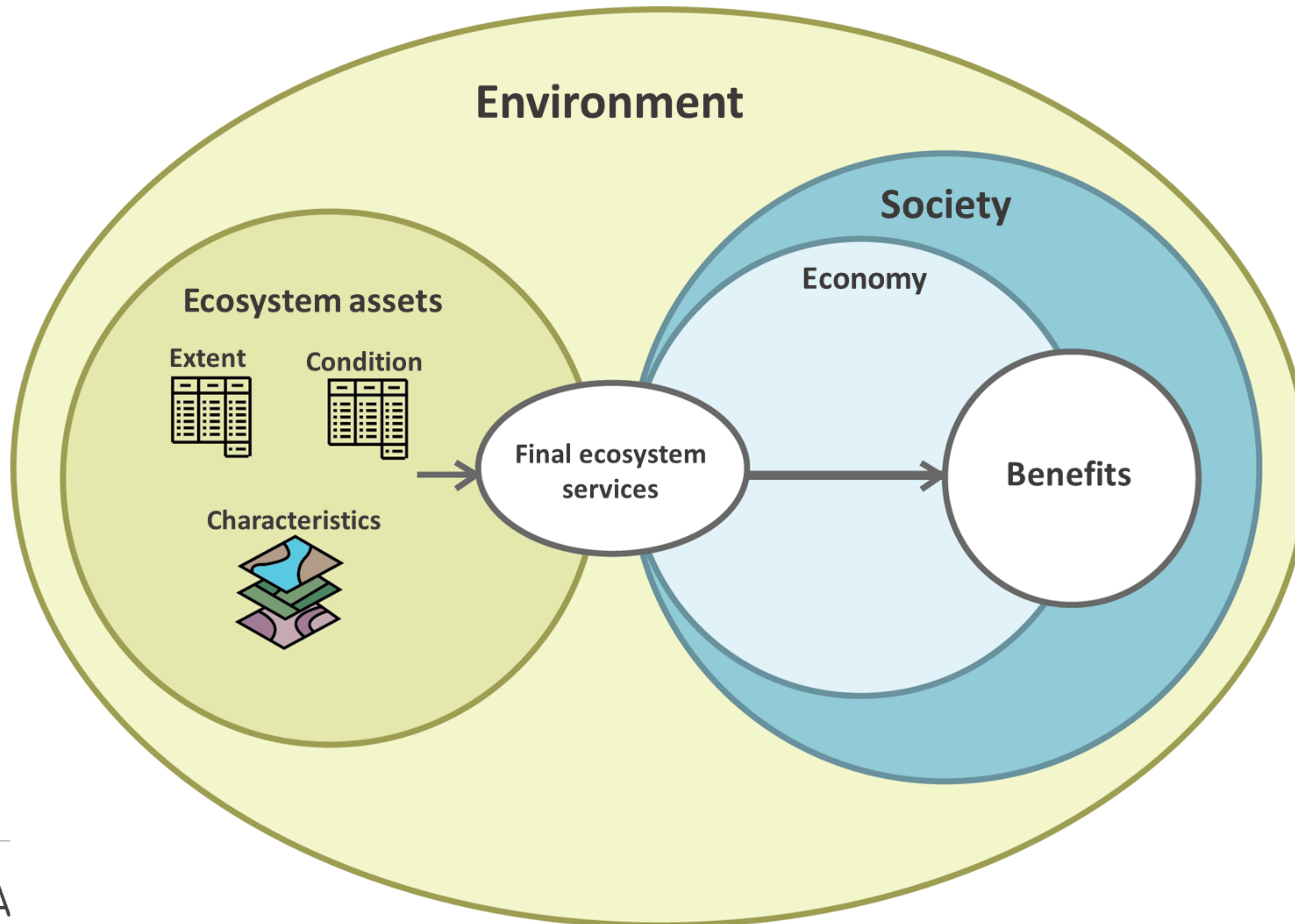
With thanks to Marko and other colleagues for their inputs



United Nations

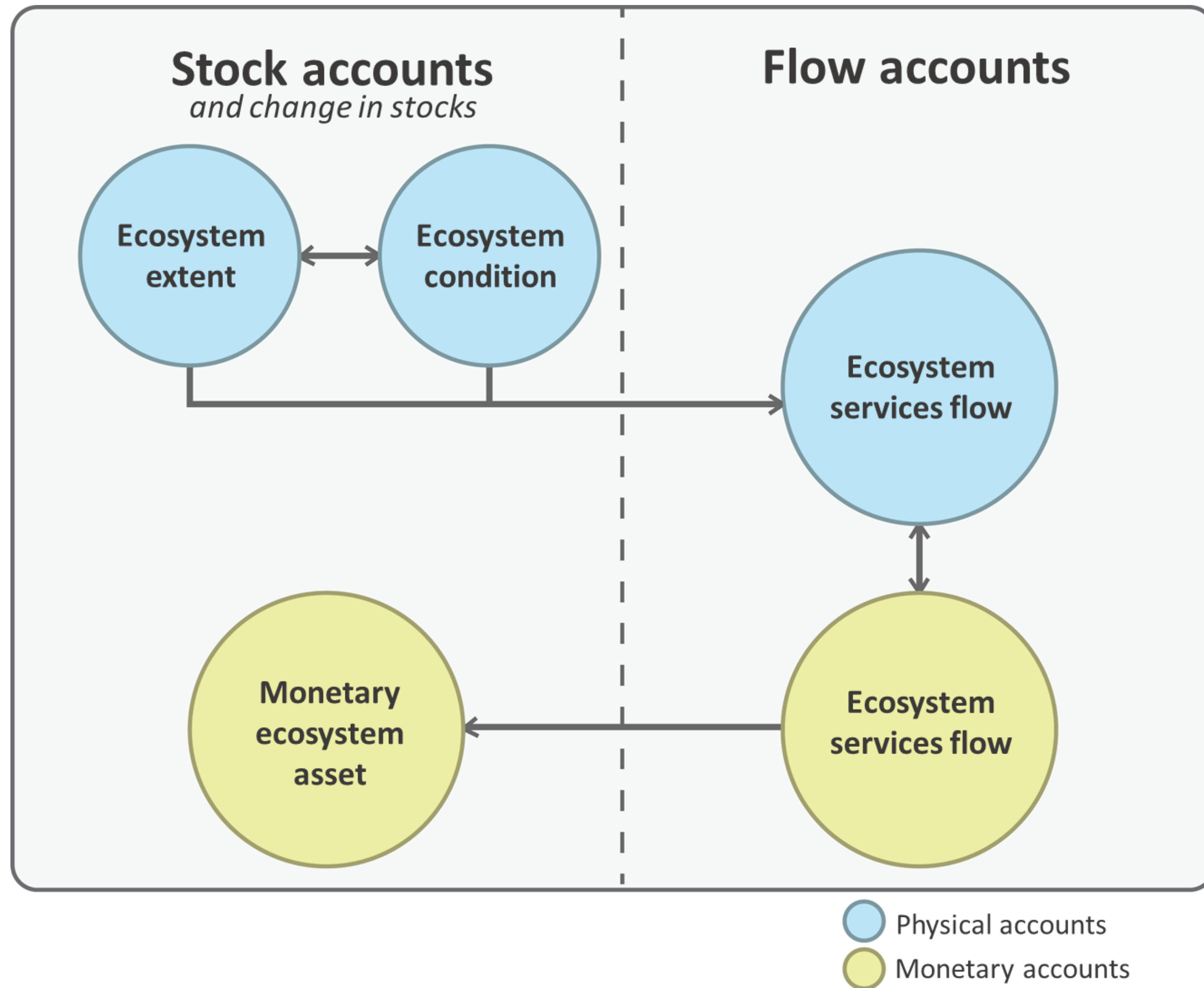


# SEEA EA Framework





# Ecosystem accounts – core accounts



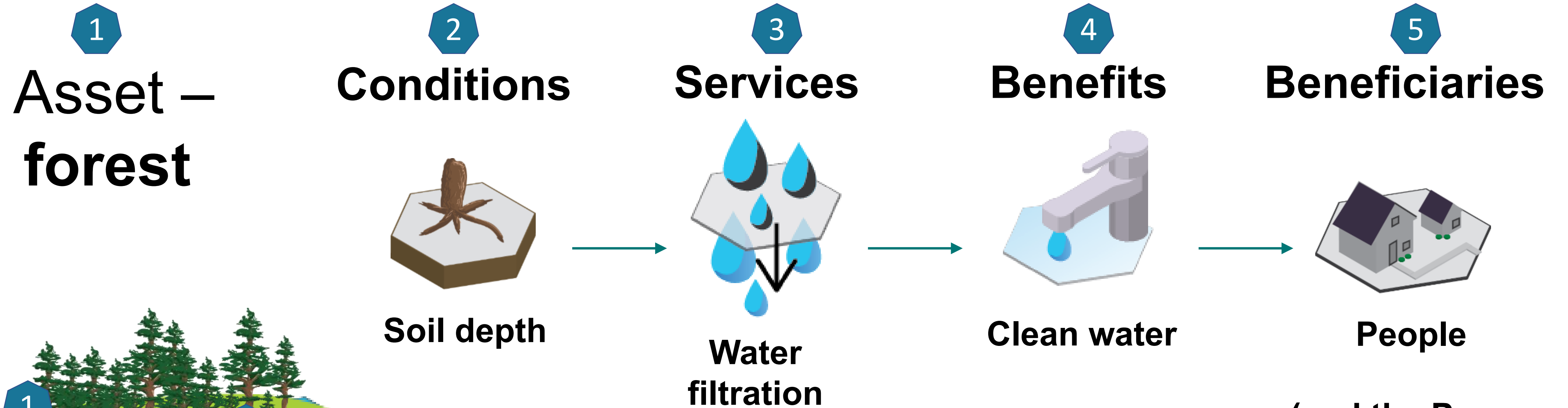


# Ecosystem services flow account

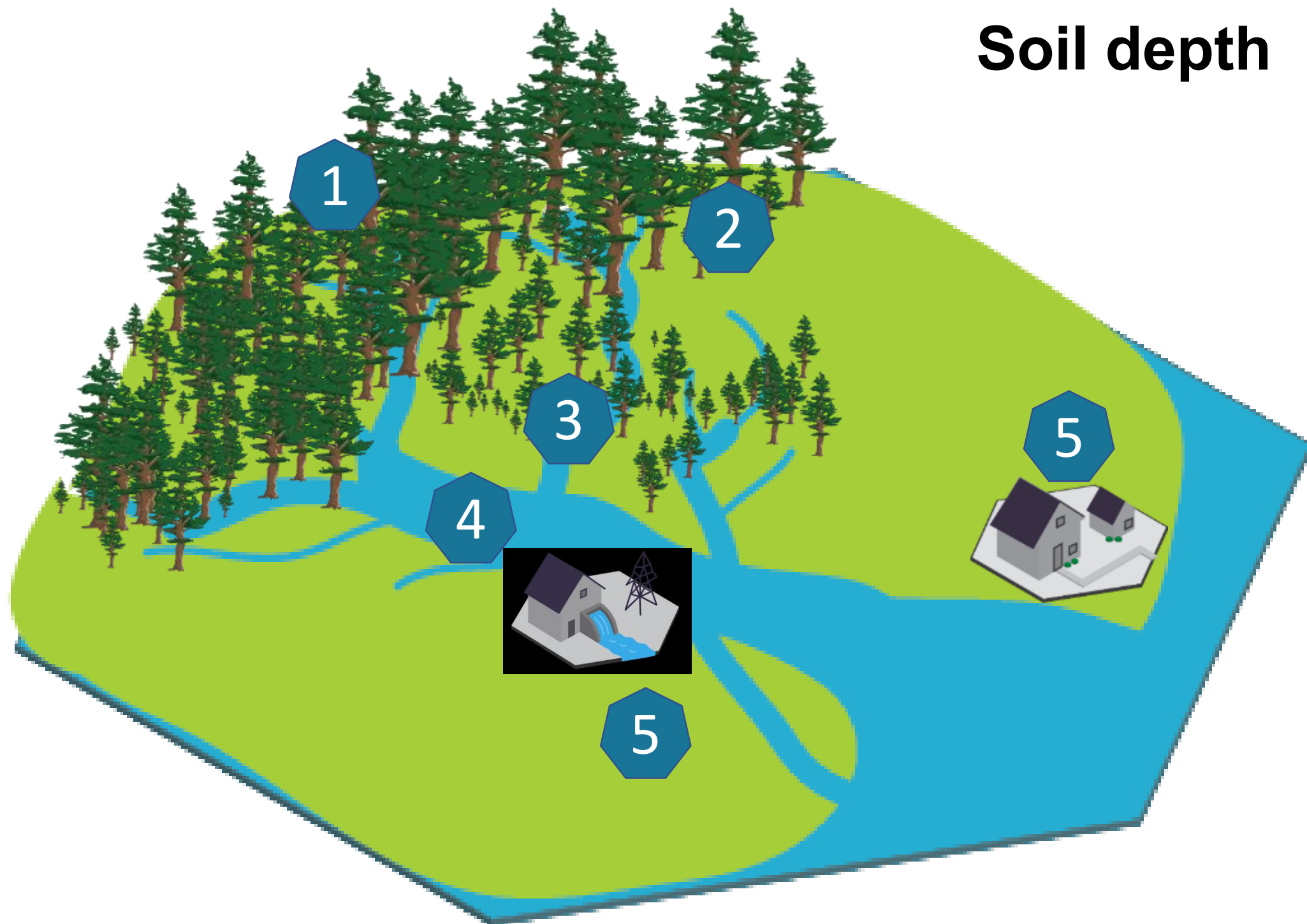
- Ecosystem services are the contributions of ecosystems to the benefits that are used in economic and other human activity.
- Ecosystem services are not same as benefits
- Need to understand ecosystem services and their reference list
- The account records **flows of ecosystem services** supplied by ecosystem assets and used by economic units (industries, households, government) during an accounting period
  - > **Alignment between supply and use** (i.e. supply needs to match use of a particular service)
- Both **physical and monetary units**



Let's recall an illustrative example (thank you to our colleagues from Lao PDR)



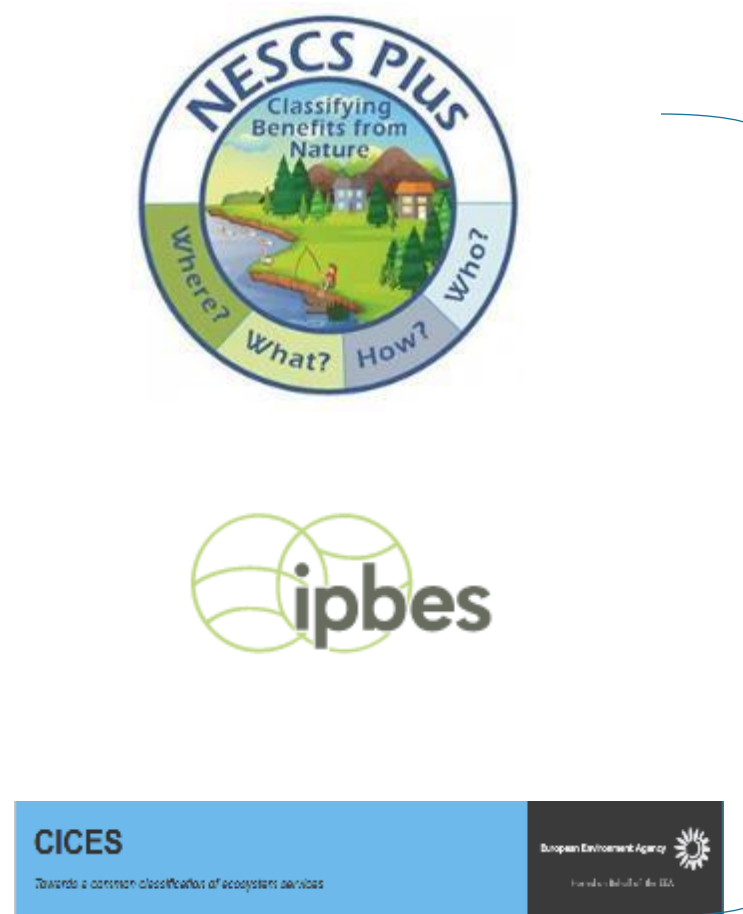
(and the Power company in the example from Lao PDR yesterday)





# Ecosystem services

- SEEA EA includes a **reference list** of ecosystem services
- Final and intermediate ES



- Provisioning:
  - > Biomass
    - Grazed biomass
    - Livestock
    - Aquaculture
    - Wood
    - Wild fish + other
    - Wild animals, plants + other
  - > Genetic material
  - > Water supply
- Cultural:
  - > Recreation-related
  - > Visual amenity
  - > Education, scientific and research
  - > Spiritual, artistic and symbolic services
- Other ES
- Non-use
- Regulating and maintenance services
  - > Global climate regulation
  - > Rainfall pattern
  - > Local (micro and meso) climate regulation
  - > Air filtration
  - > Soil quality regulation
  - > Soil and sediment retention
  - > Solid waste remediation
  - > Water purification
  - > Water flow regulation
  - > Flood control
  - > Storm mitigation
  - > Noise attenuation
  - > Pollination
  - > Biological control
  - > Nursery population & habitat maintenance



# Provisioning services

Selected ecosystem services (reference list)		
Provisioning services		
	Biomass provisioning	Crop provisioning
		Grazed biomass provisioning
		Livestock provisioning services
		Aquaculture provisioning services
		Wood provisioning services
		Wild fish and other natural aquatic biomass provisioning services
		Wild animals, plants and other biomass provisioning services
	Genetic material services	
	Water supply	
	Other provisioning services	



cultivated plants



wild plants and animals



reared animals



from plants



from animals



# Regulating and maintenance services

Examples

## Regulating and maintenance services

	Global climate regulation services
	Rainfall pattern regulation services
	Local (micro and meso) climate regulation services
	Air filtration services
	Soil quality regulation services
	Soil and sediment retention services
	Solid waste remediation services
	Water purification services
	Water flow regulation services
	Flood control services
	Storm mitigation services
	Noise attenuation services
	Pollination services
	Biological control services
	Nursery population & habitat maintenance services
	Other regulating and maintenance services

mediation of  
wastes

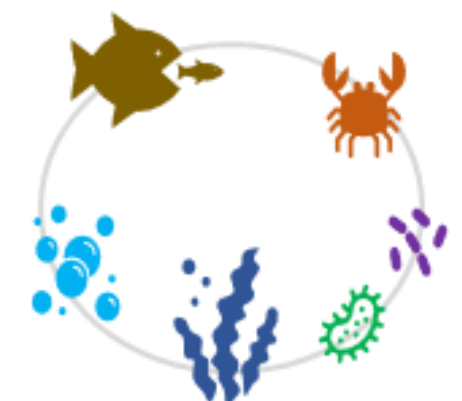


Transformation of biochemical (and  
physical) inputs to ecosystems

regulation of  
flows



Regulation of baseline  
flows and extreme events



Lifecycle maintenance,  
gene pool protection



# Cultural services

## Examples

Cultural services	
Recreation-related services	
Visual amenity services	
Education, scientific and research services	
Spiritual, artistic and symbolic services	
Other cultural services	

Direct, in-situ interactions  
with living systems



Physical and experiential  
interactions



Intellectual and  
representative interactions

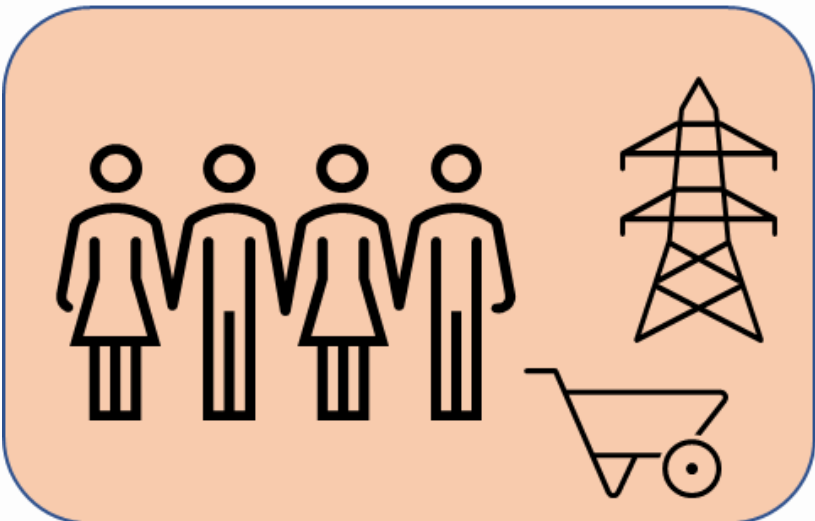


# Ecosystem services supply, actual flow and use

what ecosystems can provide

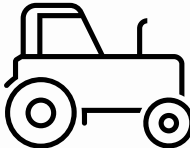


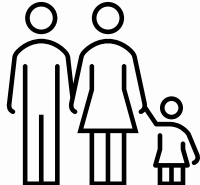


what humans (economy and society) need



Ecosystem Service Actual Flow

Supply table	ET 1	ET 2	...
ES 1			
ES 2			
ES ...			

Use table	Industries	Households	...
ES 1			
ES 2			
ES ...			



# Supply Table

SUPPLY			Economic units												Ecosystem type (based on the EFG level 3 of IUCN GET)																																							
Ecosystem services (reference list)		MEASUREMENT UNIT	Industries										Terrestrial										Freshwater			Marine																												
			Agriculture	Forestry	Fisheries	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and remediation activities	Services	Other Industries	Total Industry	Government consumption	Household consumption	Total supply by resident economic units	Supply by non-resident economic units – Imports	Total supply by economic units	T1 Tropical-subtropical forests	T2 Temperate-boreal forests and woodlands				...		T7		F1	...	FM1	M1	...	MFT1	Total supply by resident ecosystem assets	Supply from non-resident ecosystem assets - Imports	Total supply by ecosystem assets	TOTAL SUPPLY																		
																		T1.1	T1.2	T1.3	T1.4	T2.1	T2.2	...	...	T2.6	...	...	...	T7.5	F1.1	...	FM1.3	M1.1	...	MFT1.3																		
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# Use Table

[illegible]



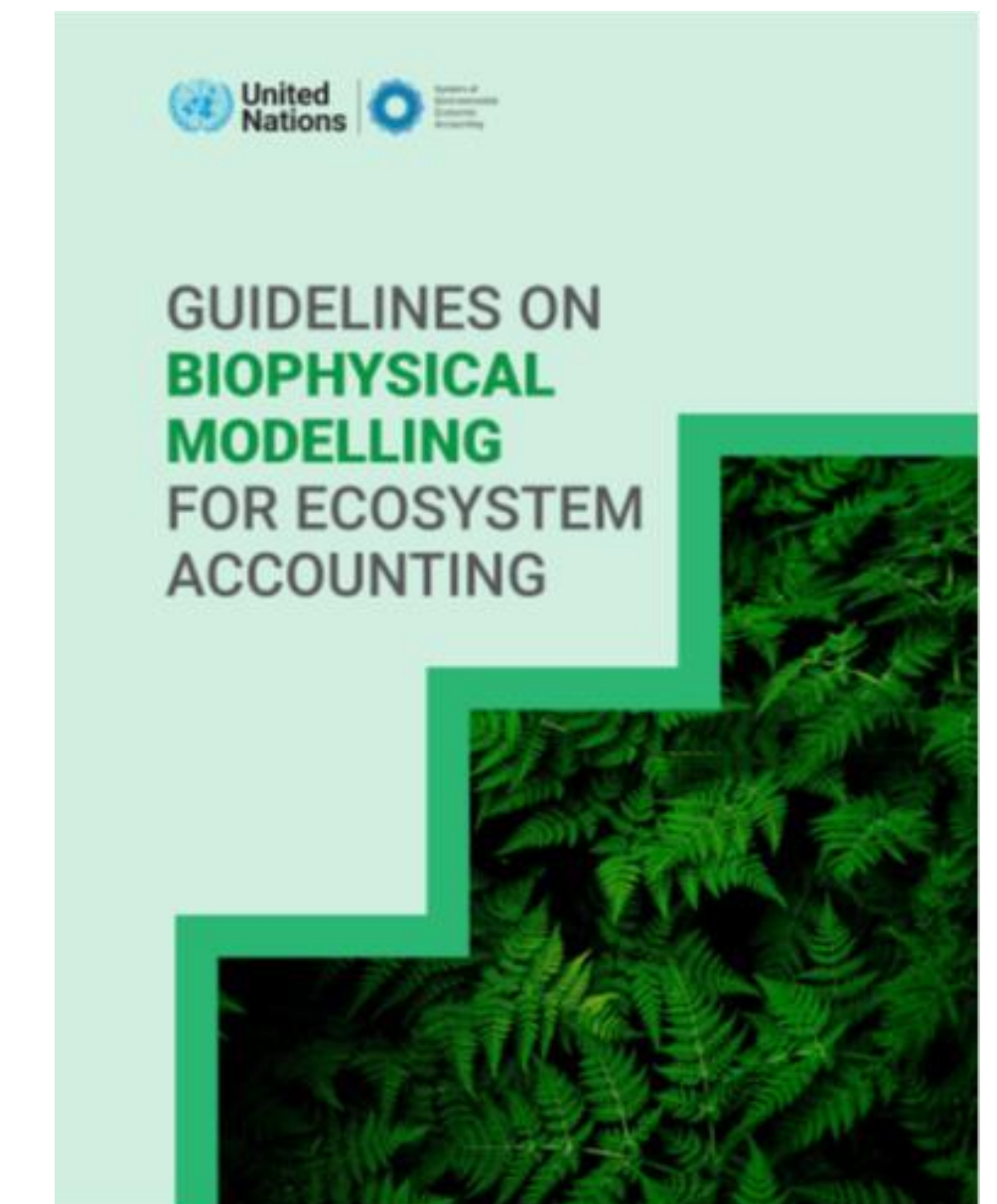
# Biophysical modelling of ecosystem services

- What is biophysical modelling?
  - > Quantitative estimation of biophysical phenomena or processes that are difficult to fully observe directly
  - > Biophysical models are very useful for understanding ecosystem service supply
- Why do we need biophysical modelling?
  - > Data needed for ecosystem accounts not usually captured in regular data sources
  - > Measuring ecosystem services directly is often difficult or costly to measure in situ
  - > Data may only be available for specific locations
- Many modelling techniques are available, including look-up tables, spatial interpolation, geostatistical models, dynamic systems, etc.
- Many platforms are available for modelling ecosystem services, including AIRES, InVEST, INCA/ESTIMAP, etc.



# Biophysical guidelines

- Why developed?
  - > Diverse models and tools have proliferated over the past decade and are constantly evolving.
  - > Most models not developed specifically for accounting purposes, many models produce results can be used directly in SEEA EA or produce results that can be modified for use in SEEA EA.
- Audience:
  - > Ecosystem accounts compilers + managers
  - > Assumes familiarity with SEEA Ecosystem Accounting but does not assume knowledge of biophysical modelling
- Tiered approach:
  - > Recognizes countries are in different circumstances (data availability + expertise)



## TIER 1

Ecosystem services modelled from global datasets with no or little user input data

## TIER 2

Ecosystem services modelled from national datasets customized for national contexts, some validation

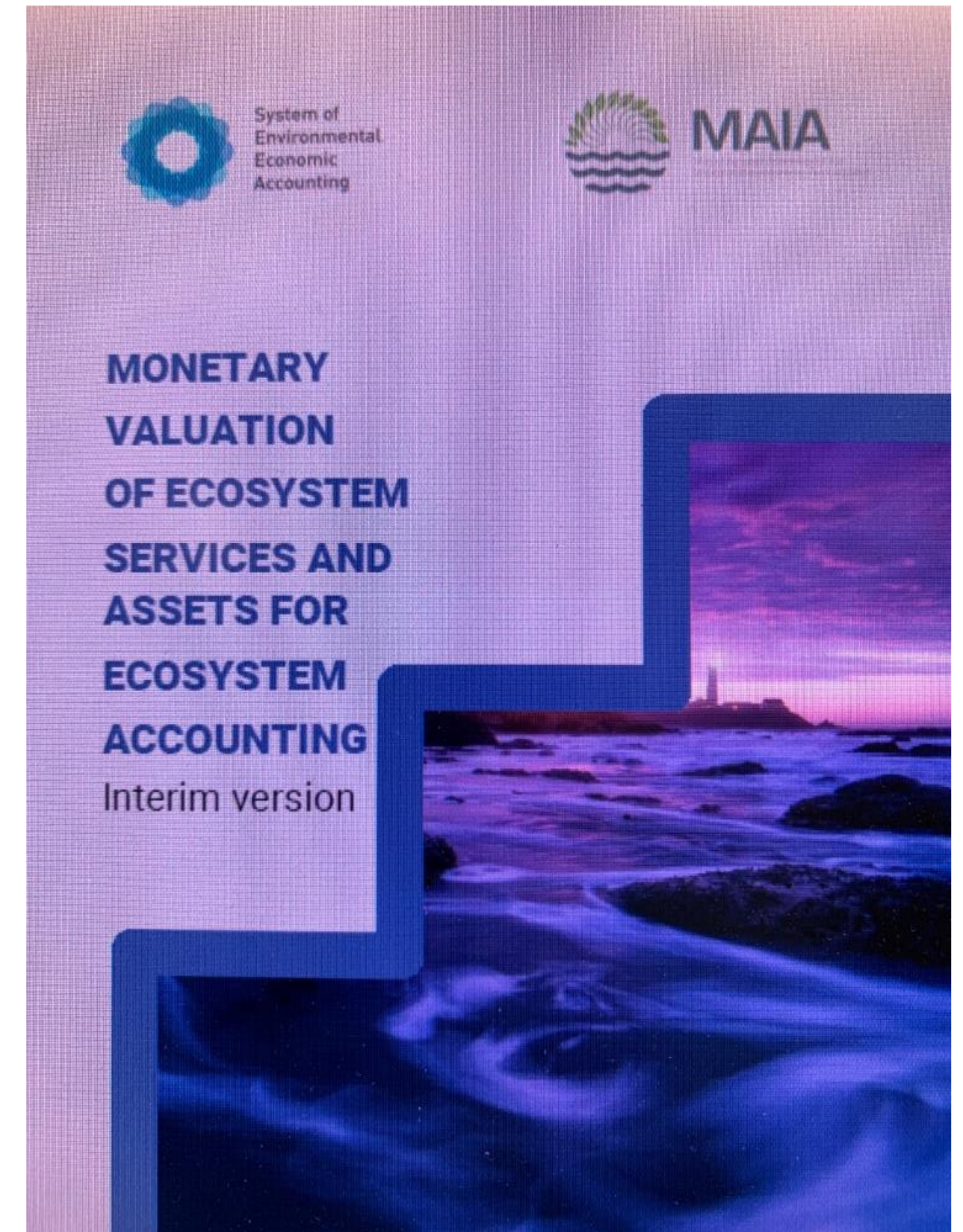
## TIER 3

Ecosystem services modelled with local data and direct surveys, better validation, and best available tools



# Technical report on valuation

- Support SEEA EA implementation in countries
- Technical report – (not guidelines)
- Scope:
  - > Valuation methods suitable for accounting
  - > Valuation methods for each of the ecosystem services
  - > Valuing ecosystem assets
  - > Other considerations
    - Value transfer
    - Platforms and tools
    - Communicating values





# Australia: National Ecosystem Accounts, experimental estimates

## Carbon retention by State/Territory, 2020–21

Graph

Table

Download

State/Territory	Grasslands (ktC)	Savannas (ktC)	Native forests (ktC)	Mangroves (ktC)
New South Wales	1,403,257	-	3,431,582	1,131
Victoria	540,621	-	930,265	3,576
Queensland	1,944,674	1,631,383	5,381,659	113,401
South Australia	2,912,547	-	436,816	7,715
Western Australia	5,378,443	1,533,143	2,530,185	15,456
Tasmania	161,456	-	648,872	466
Northern Territory	2,077,628	2,521,317	776,806	66,536
Australian Capital Territory	2,887	-	47,379	-



# Australia: National Ecosystem Accounts, experimental estimates

## Dwellings protected by Mangroves and Saltmarsh by State/Territory, 2020-21

Graph

Table

Download

State/Territory	Mangroves (no. dwellings)	Saltmarsh (no. dwellings)
New South Wales	494	89
Victoria	50	181
Queensland	3,190	150
South Australia	3	28
Western Australia	0	86
Tasmania	0	32
Northern Territory	270	0



# Australia: National Ecosystem Accounts, experimental estimates

## National wild fish provisioning services by ecosystem, 2020–21

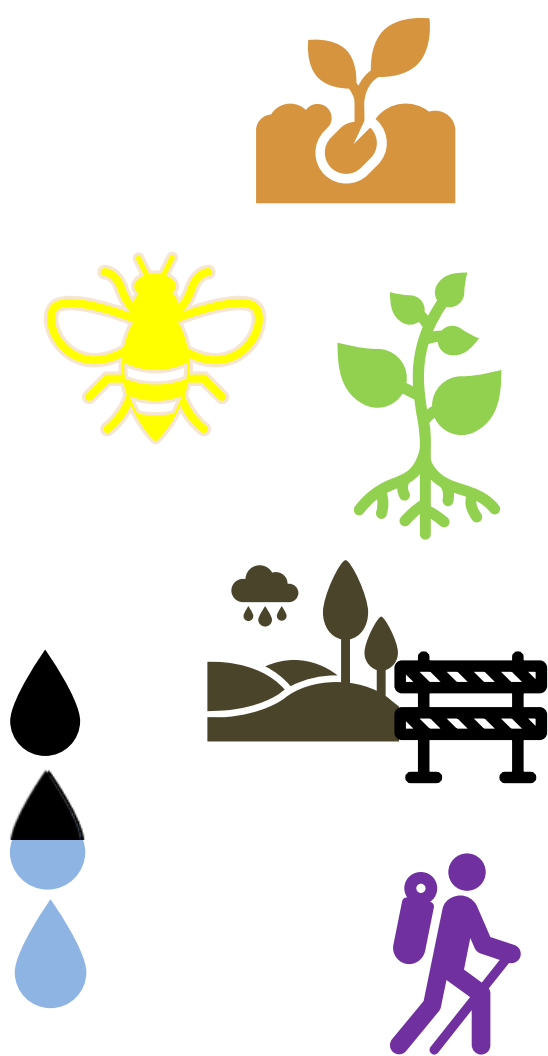
Graph	Table	Download		
Ecosystems	Finfish (kg/yr)	Crustaceans (kg/yr)	Molluscs (kg/yr)	Unspecified (kg/yr)
Subtidal sand beds	4,678,795	5,249,863	2,850,070	3,291,919
Epipelagic ocean waters	16,905,466	0	550,481	15,503,537
Continental and island slopes	4,594,773	33,771	279,250	1,133,826
Other ecosystems	699,600	179,471	31,871	325,113



# Example of Supply table for Europe



	Ecosystem types										
	Urban	Cropland	Grassland	Woodland & forest		Wetland	Heathland and shrub	Sparsely vegetated land	Rivers and lakes	Coastal /intertidal area	Total
				Available for Wood Supply	Other						
crop provision (1,000 tonne)		93,936									93,936
timber provision (1,000 m3)				885							885
crop pollination (1,000 tonne)		10,447									10,447
soil retention (mln tonne)		1,115									1,115
carbon sequestration (mln tonne)	-	-	-	306		-	-	-	NA	NA	306
flood control (1,000 hectare)	26	313	767	2,923		67	72	0,2	NA	NA	4,170
water purification (1,000 tonne)	510	13,882	2,314	3,032		73	154	45	216		20,166
habitat & species maintenance (mln euro)	NA	15,731	4,473	12,448		683	1,250	385	689	NA	35,660
nature-based recreation (1,000 nbr visits)	66	3,279	6,237	24,198		1,971	2,318	1,058	778	220	40,125





# THANK YOU

[seea@un.org](mailto:seea@un.org) // <https://seea.un.org/>

