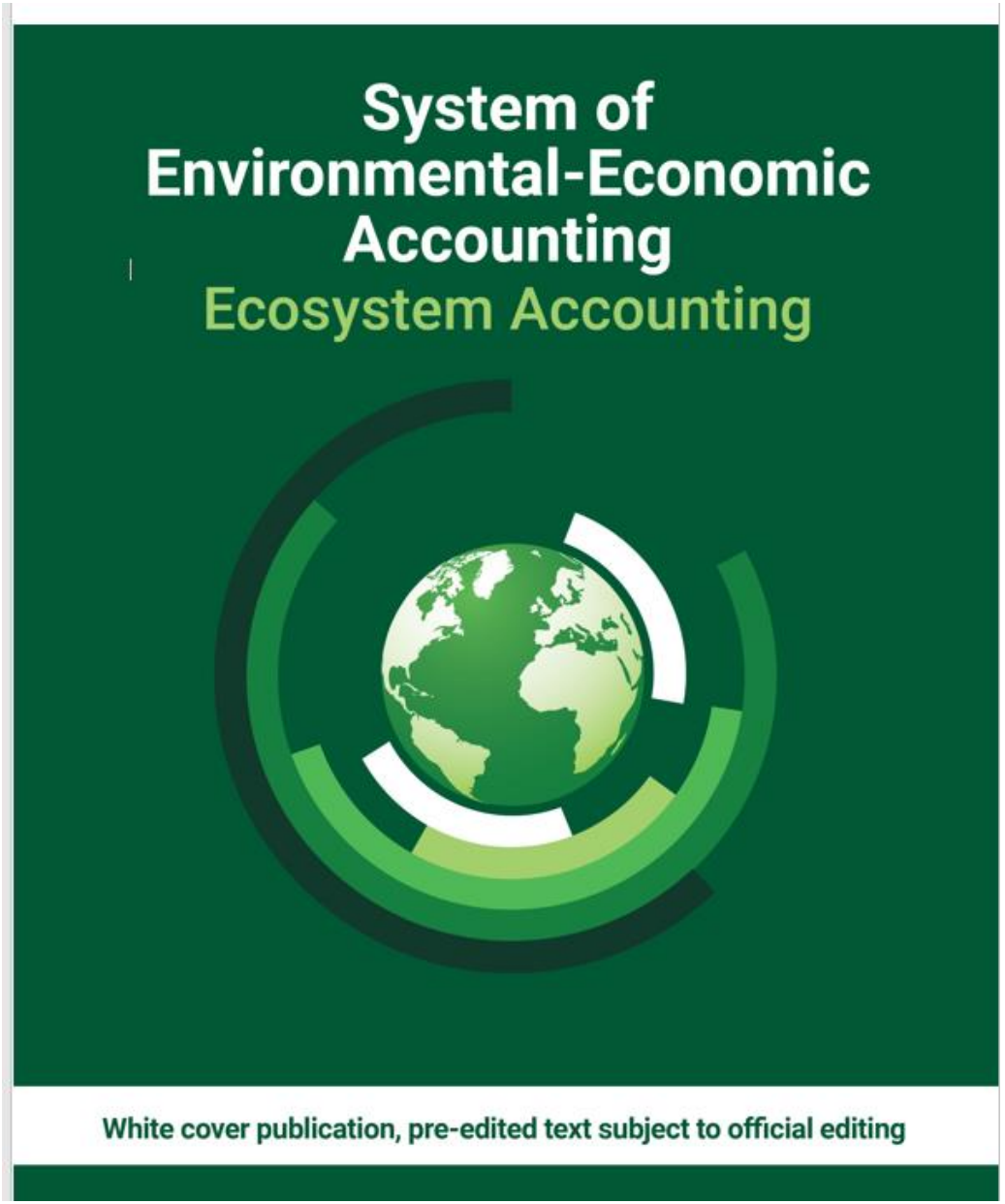
SEEA EA
Ecosystem Services Accounts

The fourth webinar for System of Environmental Economic Accounting-Ecosystem Accounting , 06 May 2022

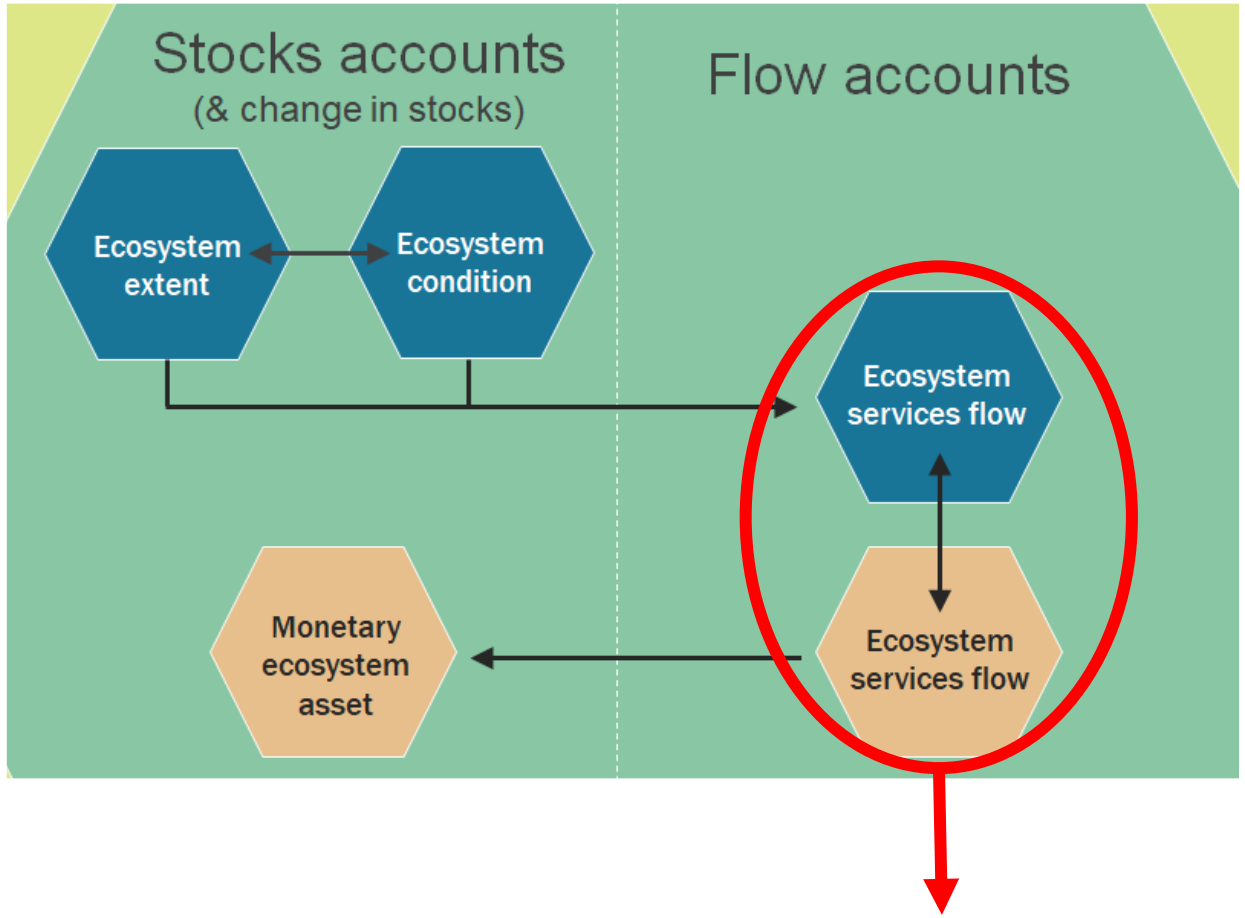
Alessandra La Notte

European Commission



Chapter 6. Ecosystem services concepts for accounting

What are Ecosystem Services in accounting terms?



Ecosystem Types *Economic Units*

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

Use table	Primary	Secondary	...
ES 1			
ES 2			
ES ...			

the flow of ecosystem services is a "transaction" between Ecosystem Types and Economic Units

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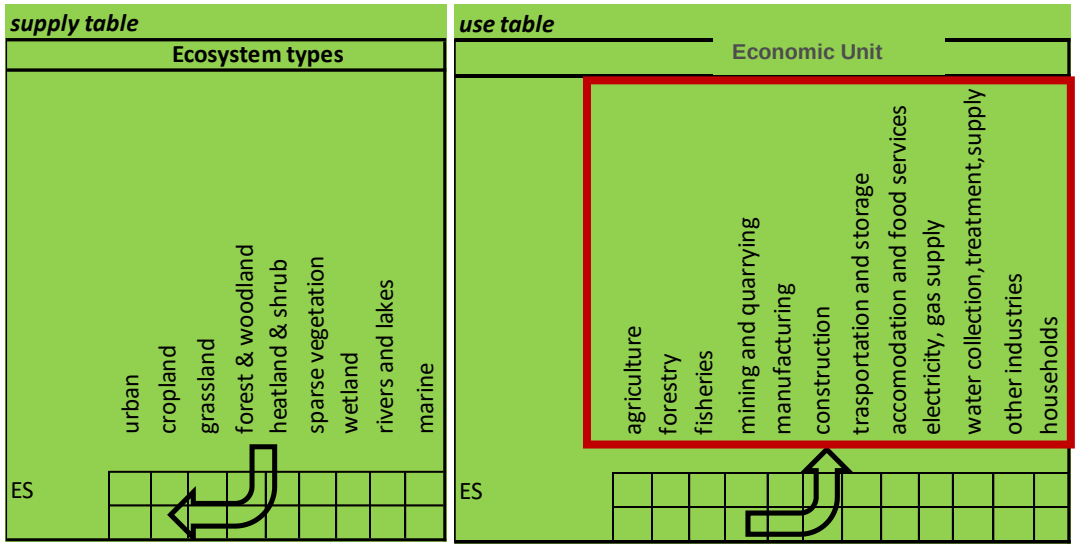
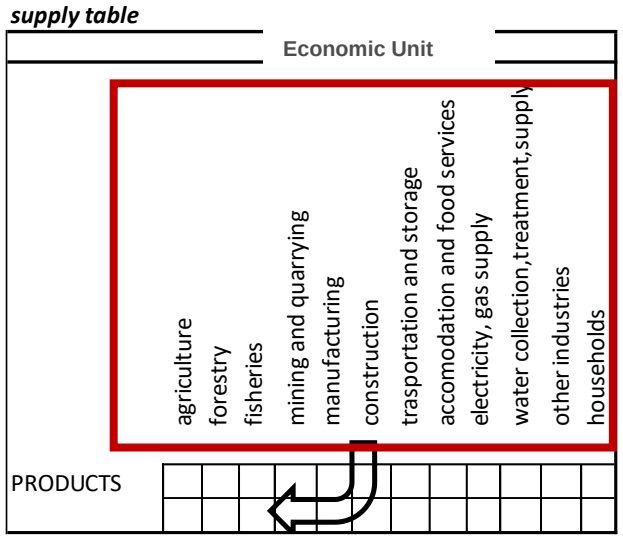
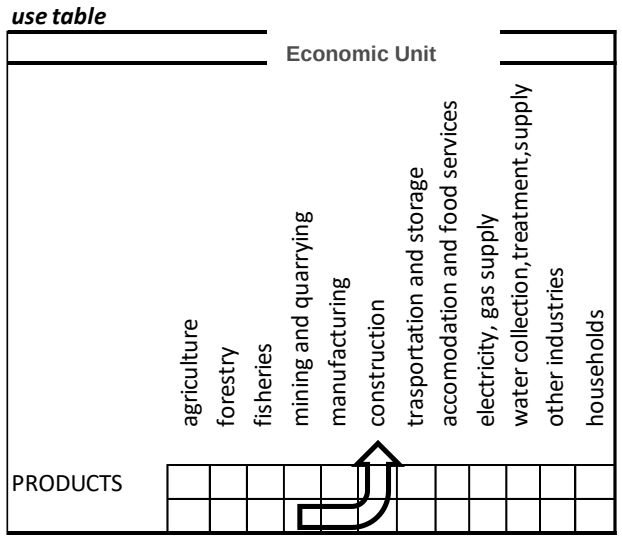
Why do we need ES accounts: to connect to economic systems



Satellite accounts





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What do we need to know about Ecosystem Services?

- meaning of ecosystem services
- classification of ecosystem services
- relationship between the “supply” and “actual flow” (use) of ecosystem services
- interpretation of intermediate and final ecosystem services

Meaning of ecosystem services

	Main service-types
	PROVISIONING SERVICES
1	**Food** (e.g. fish, game, fruit)
2	**Water** (e.g. for drinking, irrigation, cooling)
3	**Raw materials** (e.g. fiber, timber, fuel wood, fodder,
4	**Genetic resources** (e.g. for crop improvement and me
5	**Medicinal resources** (e.g. biochemical products, mod
6	**Ornamental resources** (e.g. artisan work, decorative
	REGULATING SERVICES
7	**Air quality regulation** (e.g. capturing (fine)dust, cher
8	**Climate regulation** (incl. C-sequestration, influence c
9	**Moderation of extreme events** (e.g. storm protection
10	**Regulation of water flows** (e.g. natural drainage, irrig
11	**Waste treatment** (especially water purification)
12	**Erosion prevention**
13	**Maintenance of soil fertility** (incl. soil formation)
14	**Pollination**
15	**Biological control** (e.g. seed dispersal, pest and diseas
	HABITAT SERVICES
16	**Maintenance of life cycles of migratory species** (inc
17	**Maintenance of genetic diversity** (especially gene po
	CULTURAL SERVICES
18	**Aesthetic information**
19	**Opportunities for recreation & tourism**
20	**Inspiration for culture, art and design**
21	**Spiritual experience**
22	**Information for cognitive development**

Section	Division	Group
Provisioning	Nutrition	Biomass
		Water
	Materials	Biomass, Fibre
		Water
	Energy	Biomass-based energy sources
		Mechanical energy
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Mediation by biota
		Mediation by ecosystems
	Mediation of flows	Mass flows
		Liquid flows
		Gaseous / air flows
	Maintenance of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection
		Pest and disease control
		Soil formation and composition
		Water conditions
		Atmospheric composition and climate regulation
Cultural	Physical and intellectual interactions with ecosystems and land-/seascapes [environmental settings]	Physical and experiential interactions
		Intellectual and representational interactions
	Spiritual, symbolic and other interactions with ecosystems and land-/seascapes [environmental settings]	Spiritual and/or emblematic
		Other cultural outputs

...from «benefit» to «ecosystem contribution»

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Cascade model and complexity

Biophysical structure

Functions

Services

Benefits

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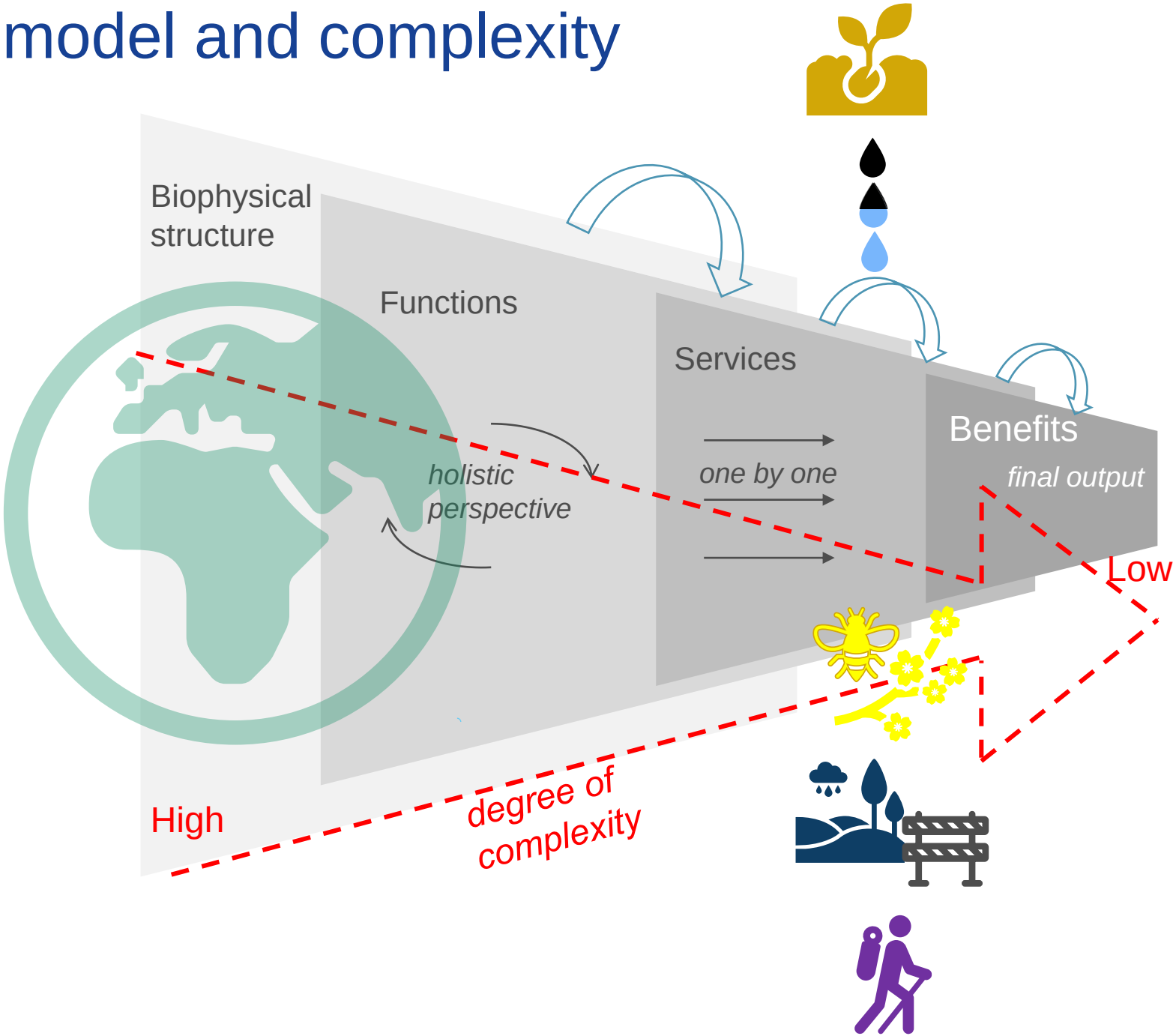
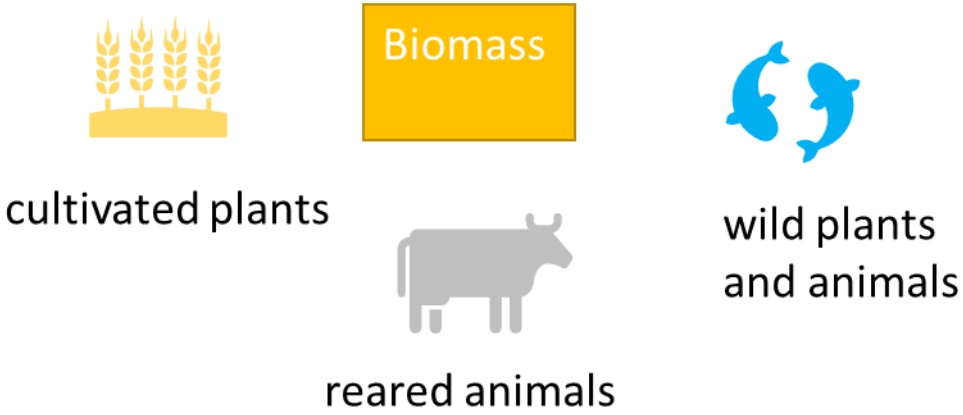
Cascade model and complexity



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	

Examples



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Regulating and maintenance services

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 attentuation services
Pollination services
Biological control services
Nursery population & habitat maintenance services
Other regulating and maintenance services

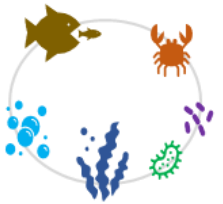
Examples

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

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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 «supply» and ecosystem «actual flow»

what ecosystems can provide

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

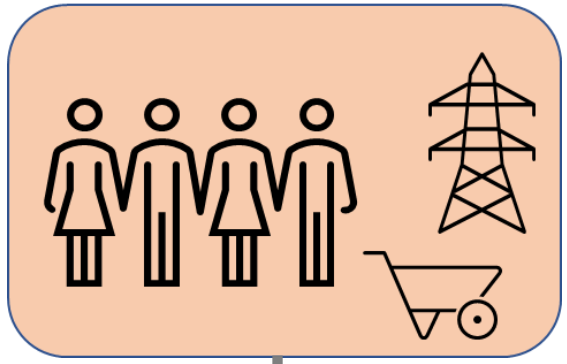
Use table	Primary	Secondary	...
ES 1			
ES 2			
ES ...			

not correct

Ecosystem «supply» and ecosystem «actual flow»

what ecosystems can provide

what humans (economy and society) need



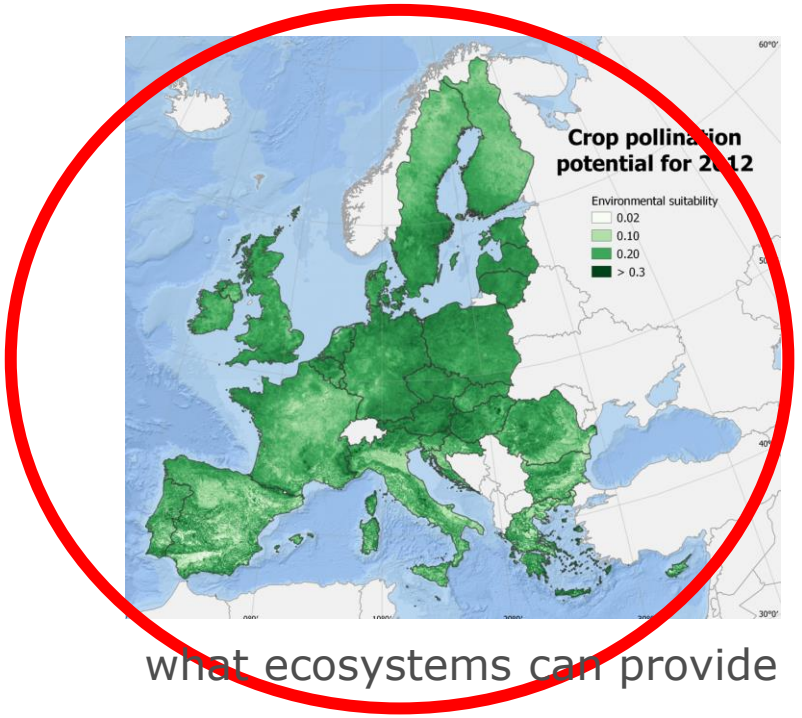
Ecosystem Service Actual Flow

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

Use table	Primary	Secondary	...
ES 1			
ES 2			

correct

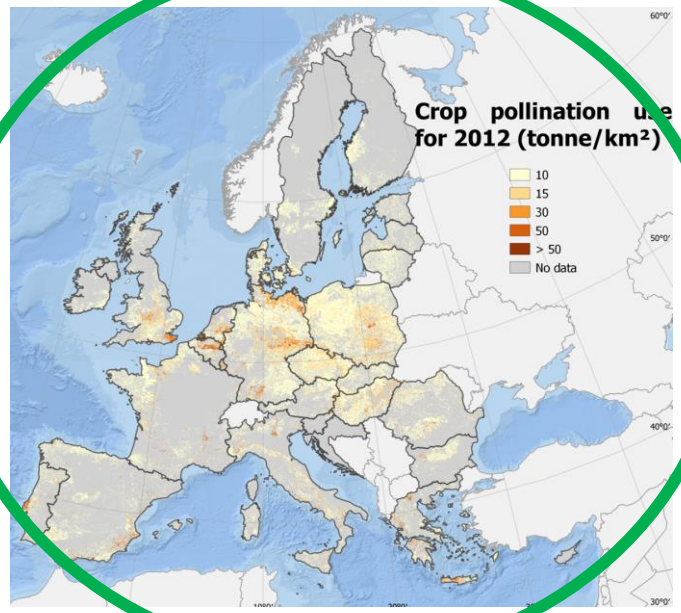
Example #1
crop pollination



what ecosystems can provide

cannot be used to fill the Supply and Use table

what economy uses



can be used to fill the Supply and Use table

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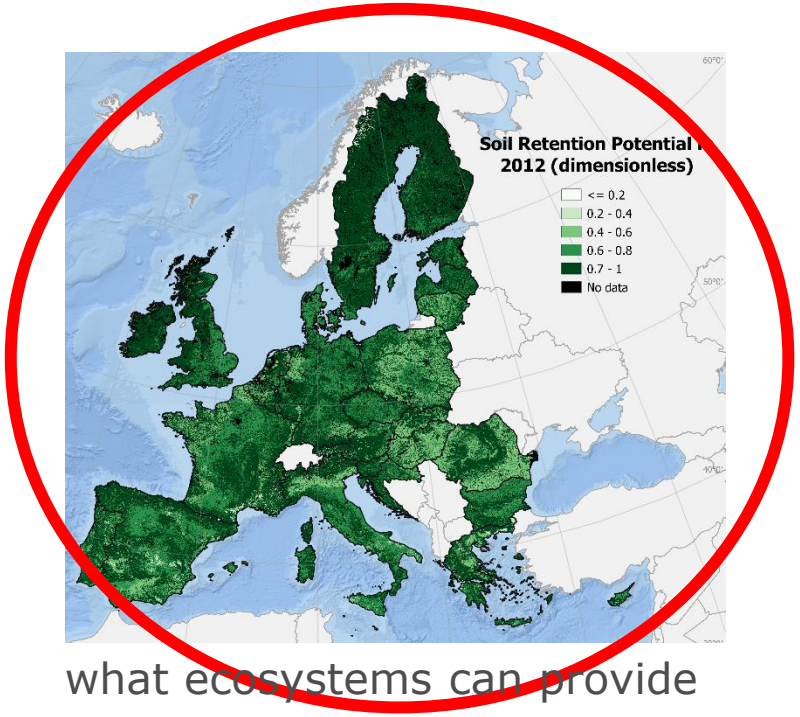
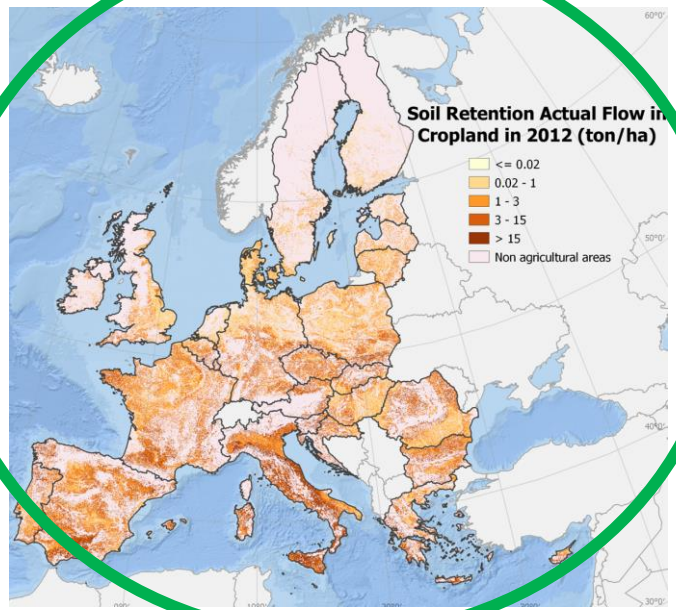
Example # 2
on-site soil retention



cannot be used to fill the Supply and Use table

what ecosystems can provide

what economy uses



can be used to fill the Supply and Use table

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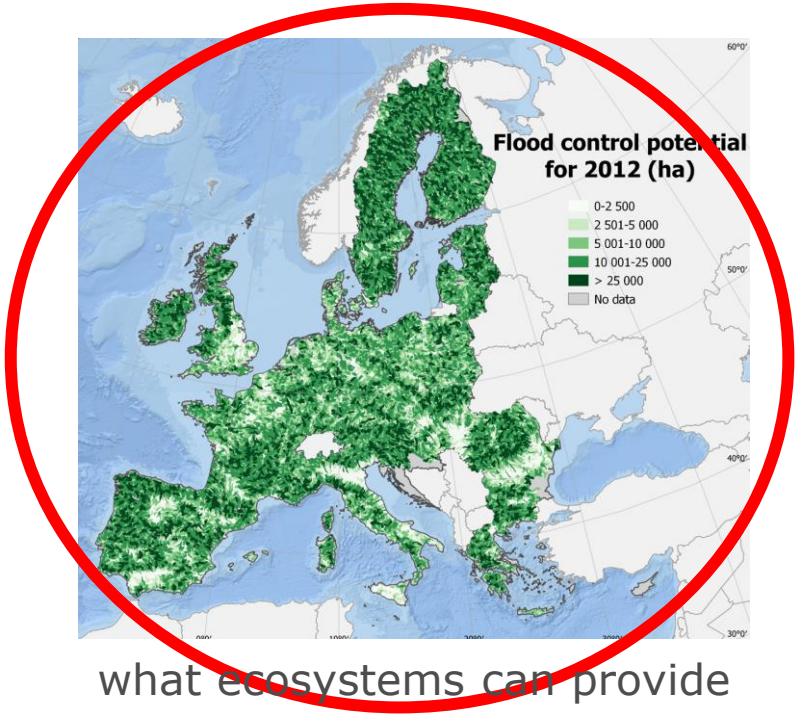
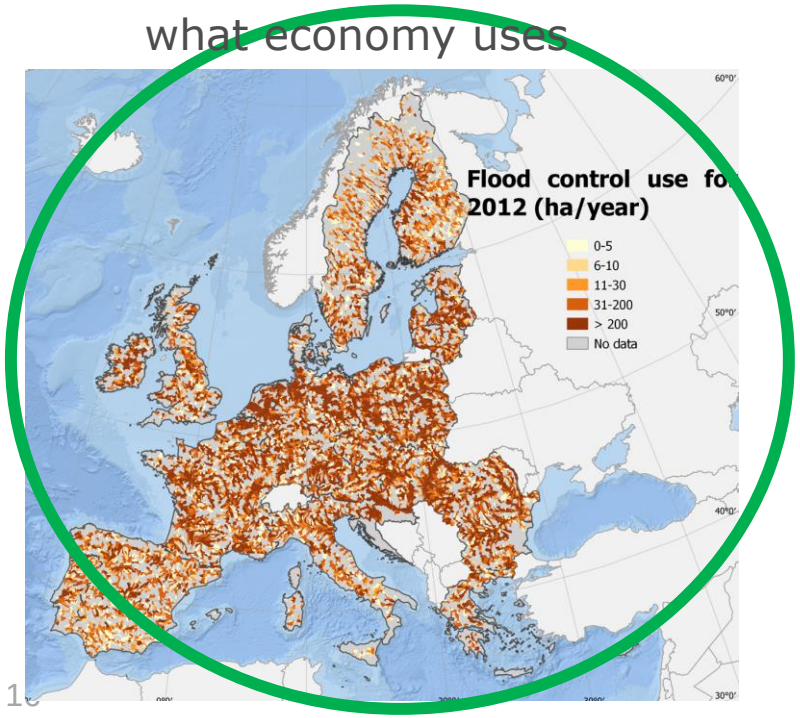
Example # 3
flood control



what ecosystems can provide

cannot be used to fill the Supply and Use table

what economy uses



can be used to fill the Supply and Use table

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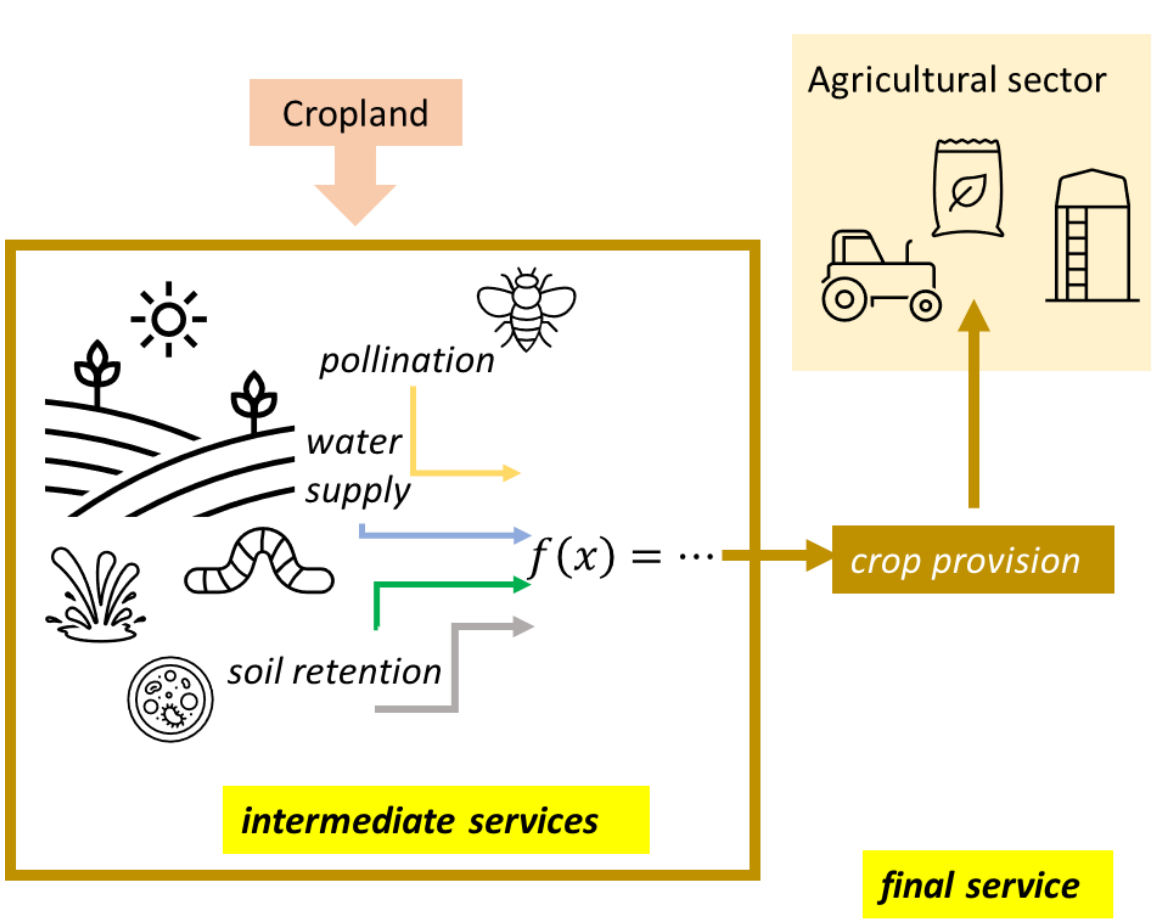
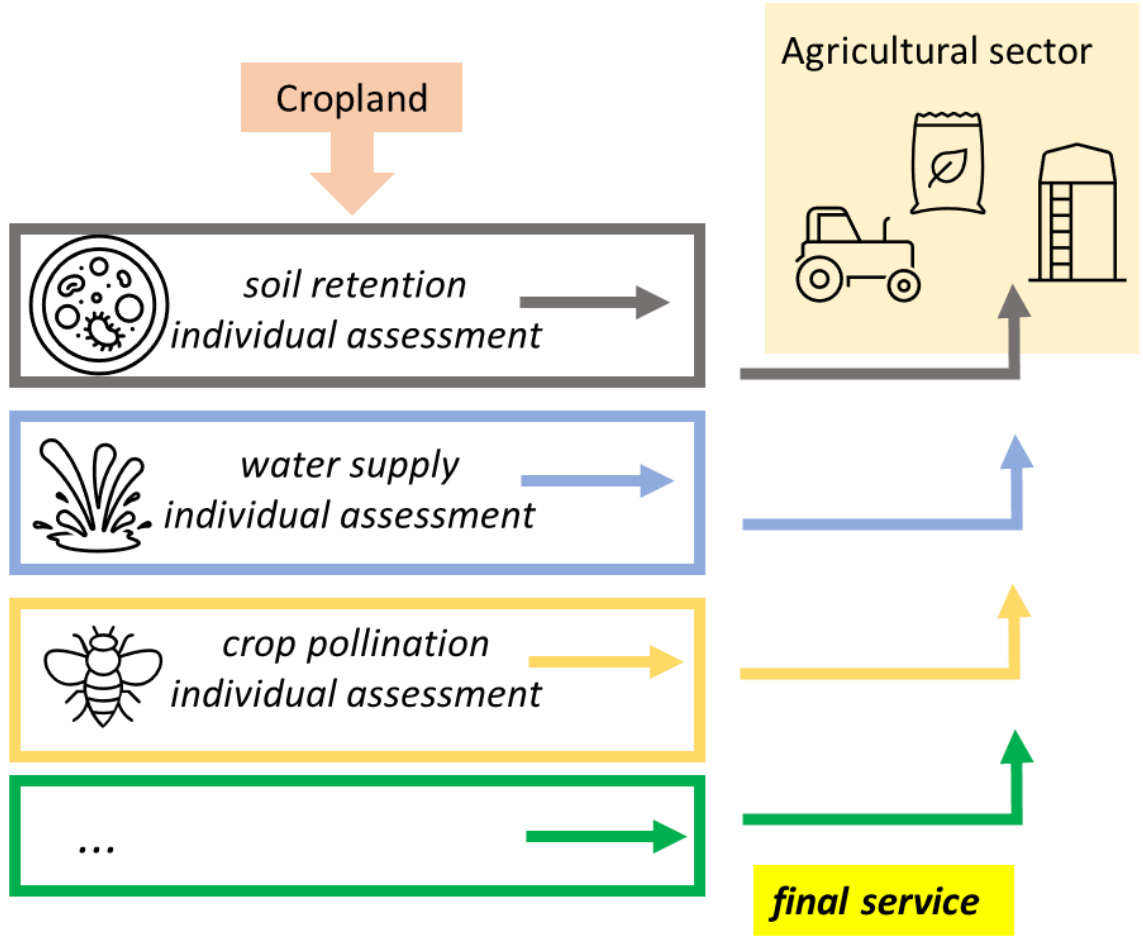
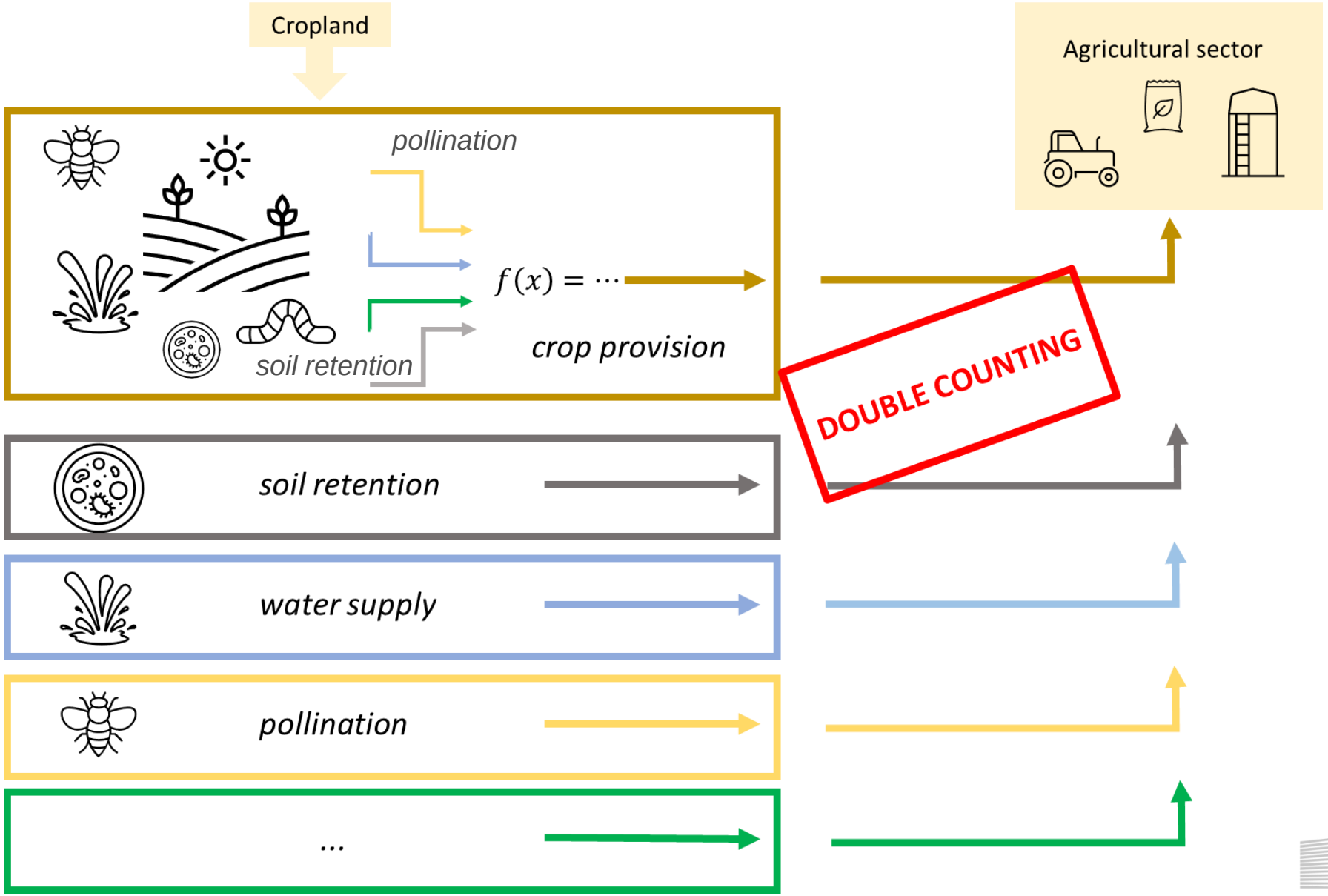
Intermediate or final?

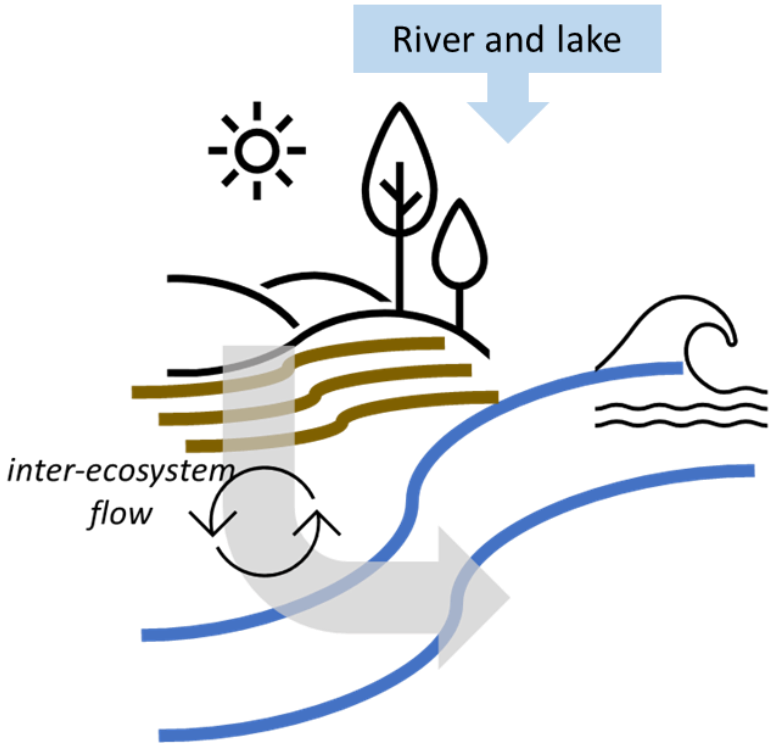


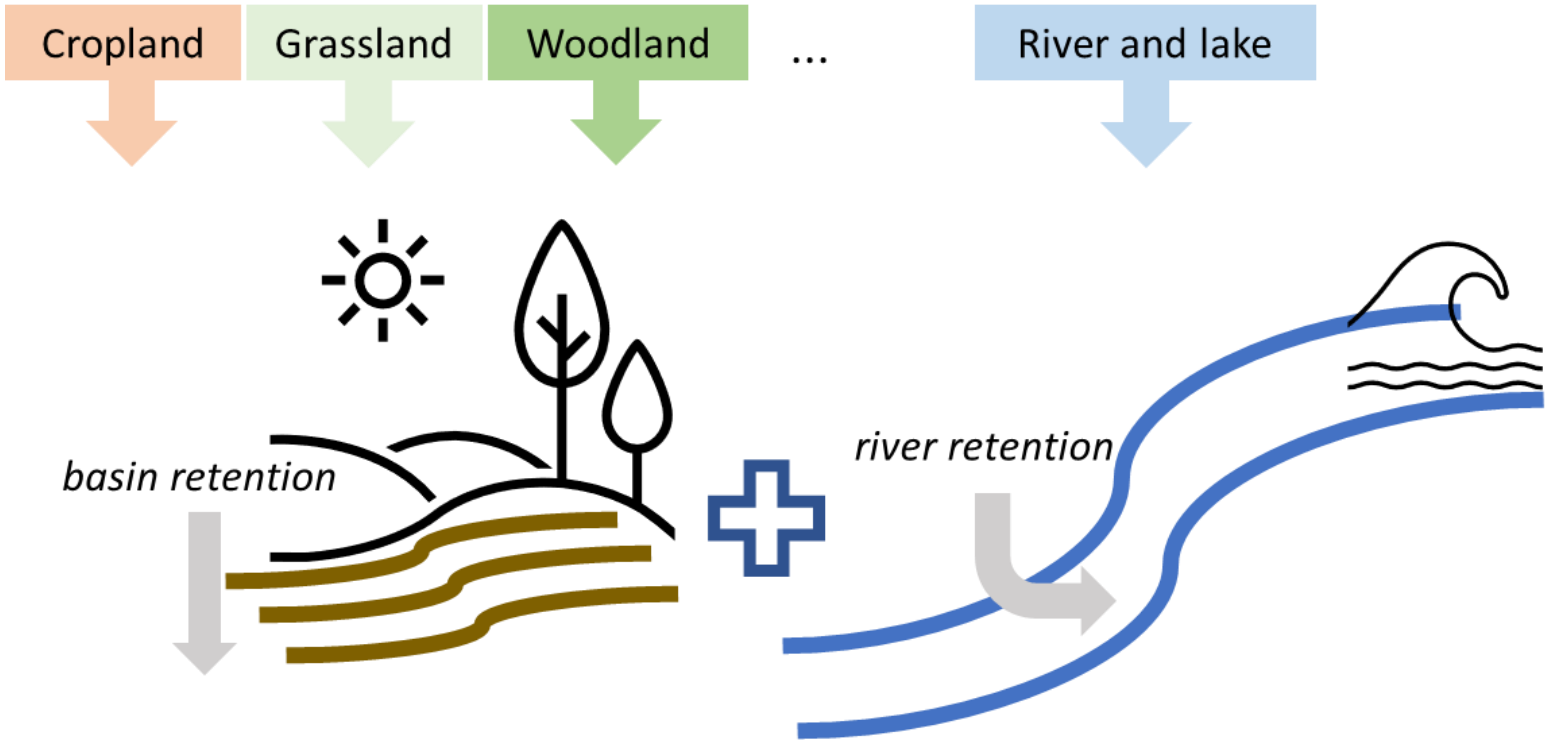


Intermediate or final?



Intermediate or final?

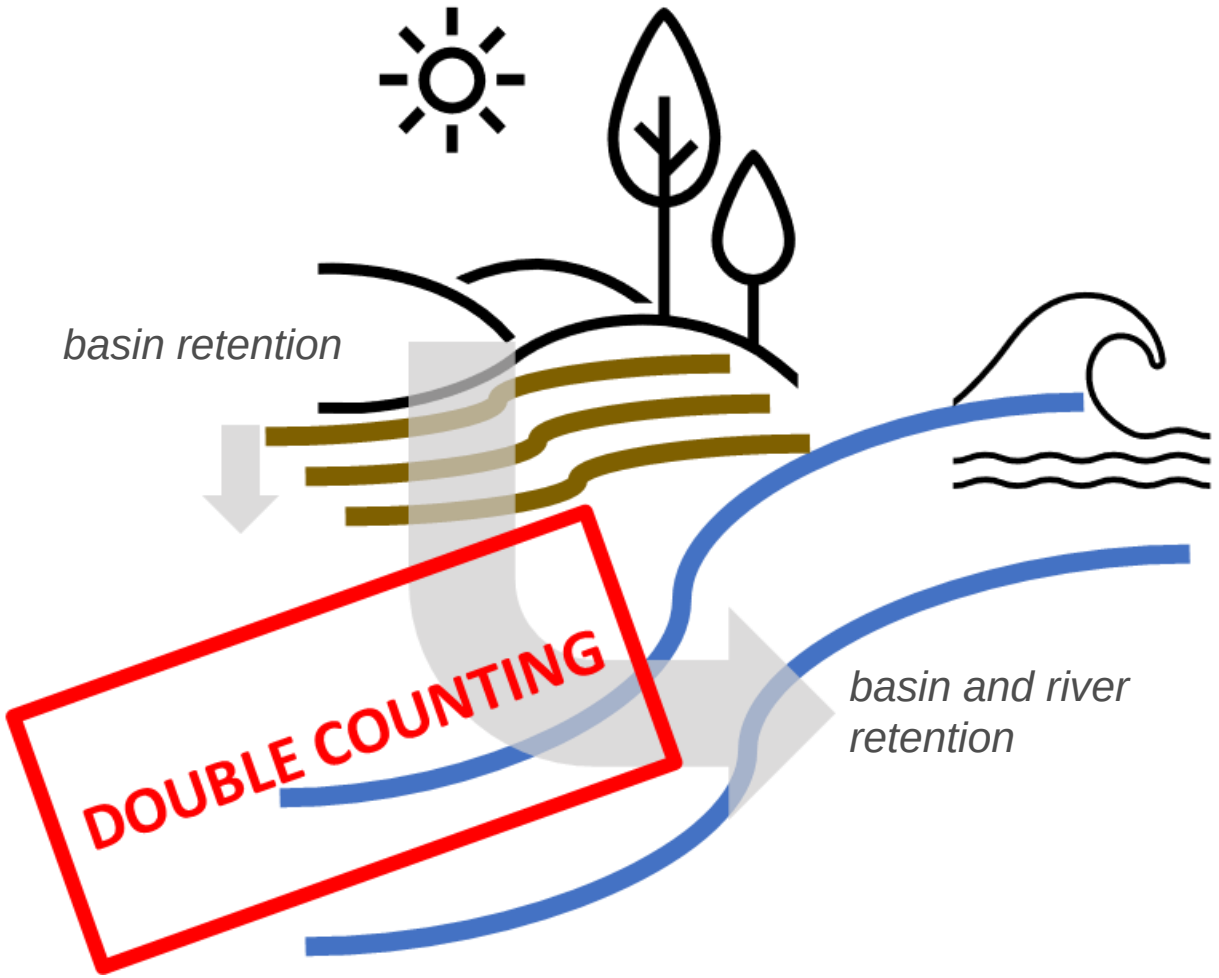


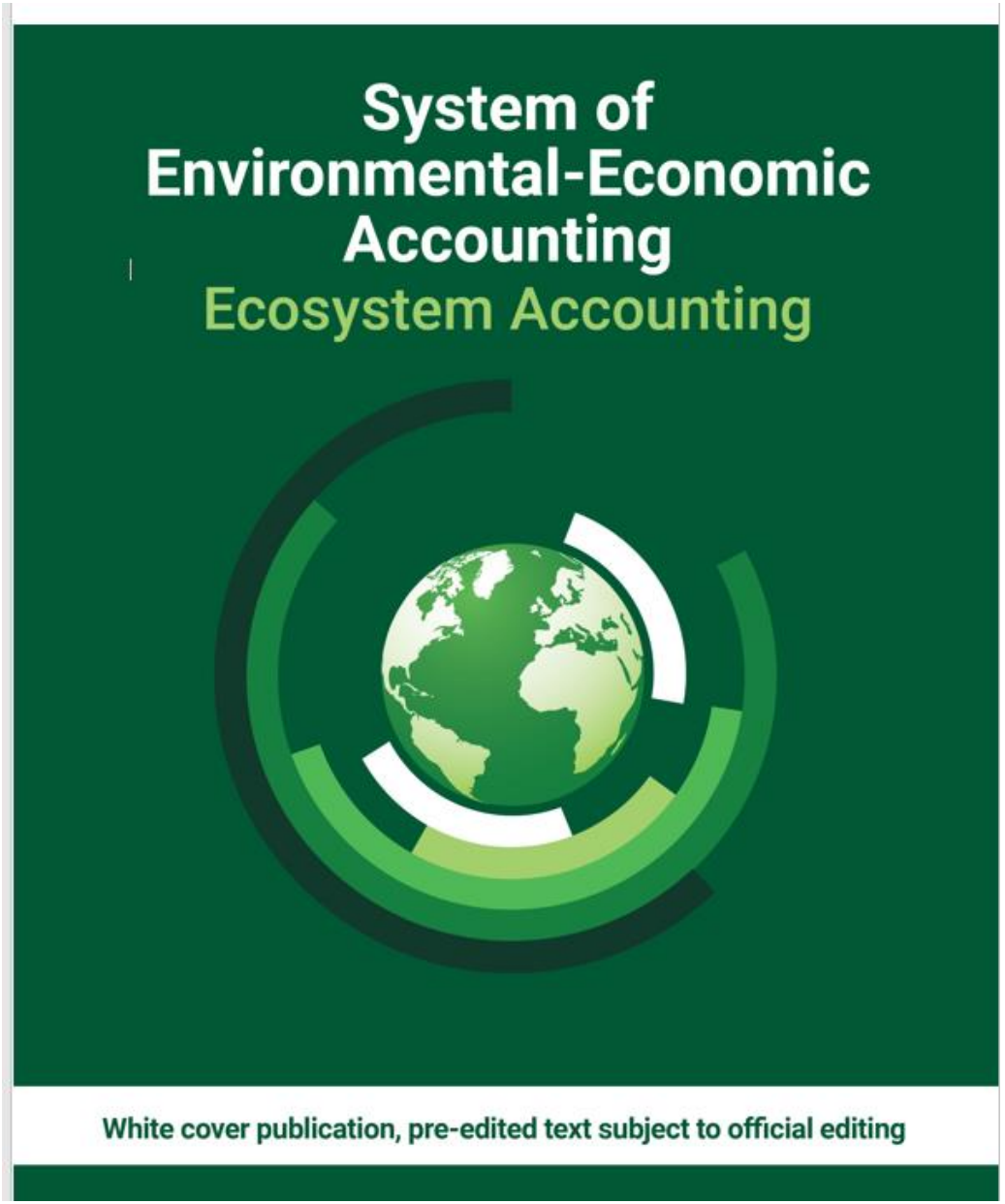


the role of basin is intermediate

the role of basin is final

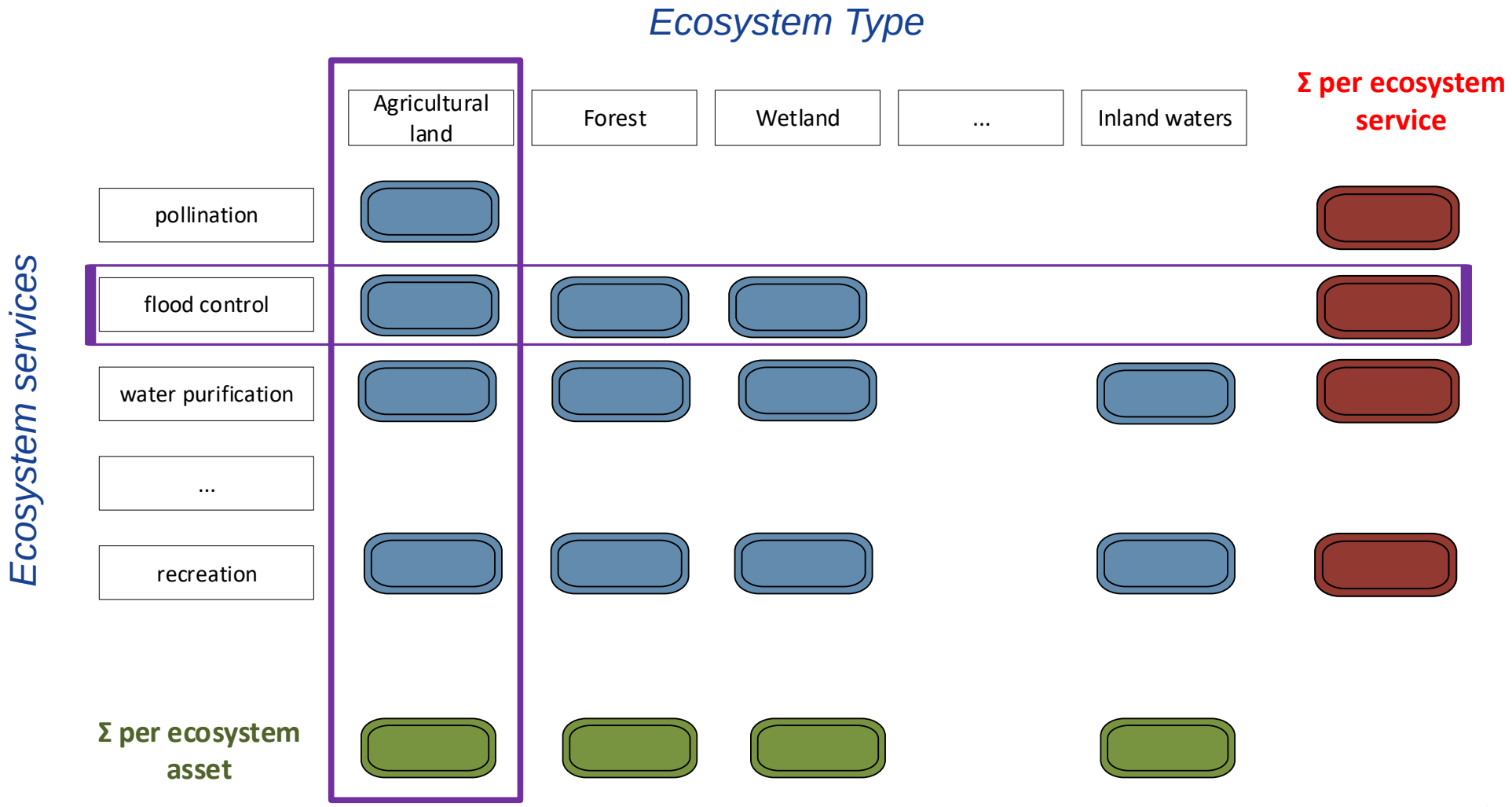
Intermediate or final?





Chapter 7.
Accounting for ecosystem services in physical terms

Ecosystem Types and Ecosystem Services



Supply Table

SUPPLY			UNITS OF MEASURE		Selected ecosystem types (based on Level 3 - EFG of the IUCN Global Ecosystem Typology)																		Total Supply resident ecosystem assets	Supply from non-resident ecosystem assets - Imports	Total Supply ecosystem services	TOTAL SUPPLY
					Terrestrial														Freshwater			Marine					
					T1 Tropical-subtropical forests				T2 Temperate-boreal forests and woodlands				...		T7		F1	...	FM1	M1	...	MFT1				
					Tropical-subtropical lowland rainforests	Tropical-subtropical dry forests and scrubs	Tropical-subtropical montane rainforests	Tropical heath forests	Boreal and temperate high montane forests and woodlands	Deciduous temperate forests	...	Temperate pyric sclerophyll forests and woodlands	...	...	...	Derived semi-natural pastures and old fields	Permanent upland streams	...	Intermittently closed and open lakes and lagoons	Seagrass meadows	...	Coastal saltmarshes and reedbeds				
					T1.1	T1.2	T1.3	T1.4	T2.1	T2.2	...	T2.6	...	...	...	T7.5	F1.1	...	FM1.3	M1.1	...	MFT1.3				
Selected ecosystem services (reference list)																										
Provisioning services																										
	Biomass provisioning	Crop provisioning																								
		Grazed biomass provisioning																								
		Livestock provisioning services																								
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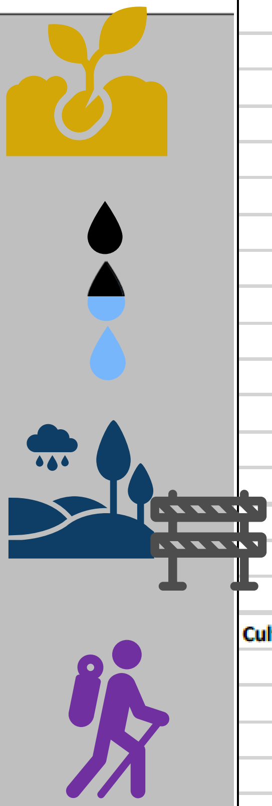
	Other regulating and maintenance services																									
Cultural services																										
	Recreation-related services																									
	Visual amenity services																									
	Education, scientific and research services																									
	Spiritual, artistic and symbolic services																									
	Other cultural services																									

Supply Table



Provisioning services		
	Biomass provisioning	Crop provisioning
		Grazed biomass provisioning
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	Biological control services	
	Nursery population & habitat maintenance services	
	Other regulating and maintenance services	
Cultural services		
	Recreation-related services	
	Visual amenity services	
	Education, scientific and research services	
	Spiritual, artistic and symbolic services	
	Other cultural services	

- EFG of the IUCN Global Ecosystem Typology)													
			Freshwater			Marine			Total Supply resident ecosystem assets	Supply from non-resident ecosystem assets - Imports	Total Supply ecosystem services	TOTAL SUPPLY
...	T7		F1	...	FM1	M1	...	MFT1				
...	...	Derived semi-natural pastures and old fields	Permanent upland streams	...	Intermittently closed and open lakes and lagoons	Seagrass meadows	...	Coastal saltmarshes and reedbeds				
...	...	T7.5	F1.1	...	FM1.3	M1.1	...	MFT1.3				

			UNITS OF MEASURE
elected ecosystem services (reference list)			
rovisioning services			
	Biomass provisioning	Crop provisioning	
		Grazed biomass provisioning	
		Livestock provisioning services	
		Aquaculture provisioning service	
		Wood provisioning services	
		Wild fish and other natural aqua biomass provisioning services	
		Wild animals, plants and other biomass provisioning services	
	Genetic material services		
	Water supply		
	Other provisioning services		
egulating and maintenance services			
	Global climate regulation services		
	Rainfall pattern regulation services		
	Local (micro and meso) climate regulation services		
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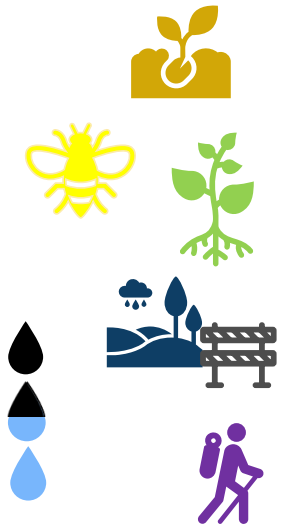
	Solid waste remediation services		
	Water purification services		
	Water flow regulation services		
	Flood control services		
	Storm mitigation services		
	Noise attenuation services		
	Pollination services		
	Biological control services		
	Nursery population & habitat maintenance services		
	Other regulating and maintenance services		
ultural services			
	Recreation-related services		
	Visual amenity services		
	Education, scientific and research services		
	Spiritual, artistic and symbolic services		

Supply Table

SUPPLY	UNITS OF MEASURE	
Selected ecosystem services (reference list)		

Selected ecosystem types (based on Level 3 - EFG of the IUCN Global Ecosystem Typology)																					
Terrestrial													Freshwater			Marine			Total Supply resident ecosystem assets	Supply from non-resident ecosystem assets - Imports	Total Supply ecosystem services	TOTAL SUPPLY
T1 Tropical-subtropical forests				T2 Temperate-boreal forests and woodlands		...		...		T7			F1	...	FM1	M1	...	MFT1				
Tropical-subtropical lowland rainforests	Tropical-subtropical dry forests and scrubs	Tropical-subtropical montane rainforests	Tropical heath forests	Boreal and temperate high montane forests and woodlands	Deciduous temperate forests	...	Temperate pyric sclerophyll forests and woodlands	...	...	Derivied semi-natural pastures and old fields			Permanent upland streams	...	Intermittently closed and open lakes and lagoons	Seagrass meadows	...	Coastal saltmarshes and reedbeds				
T1.1	T1.2	T1.3	T1.4	T2.1	T2.2	...	T2.6	...	...	...	T7.5		F1.1	...	FM1.3	M1.1	...	MFT1.3				

Example of Supply table for Europe



	Ecosystem types										
				Woodland & forest							
	Urban	Cropland	Grassland	Available for Wood Supply	Other	Wetland	Heathland and shrub	Sparsely vegetated land	Rivers and lakes	Coastal /intertidal area	Total
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 (mlln tonne)		1,115									1,115
carbon sequestration (mlln 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 (mlln 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

Use Table

USE			UNITS OF MEASURE	Selected economic units: Selected industries: 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 use by resident economic units	Exports - final ecosystem services	Total Use by economic units	Selected ecosystem types (based on Level 3 - EFG of the IUCN Global Ecosystem Typology): Terrestrial: T1 Tropical-subtropical forests: Tropical-subtropical lowland rainforests T1.1	Tropical-subtropical dry forests and scrubs T1.2	Tropical-subtropical montane rainforests T1.3	Tropical heath forests T1.4	T2 Temperate-boreal forests and woodlands: Boreal and temperate high montane forests and woodlands T2.1	Deciduous temperate forests T2.2	...	Temperate pyric sclerophyll forests and woodlands T2.6	...	...	...	T7: Derived semi-natural pastures and old fields T7.5	Freshwater: F1: Permanent upland streams F1.1	...	FM1: Intermittently closed and open lakes and lagoons FM1.3	Marine: M1: Seagrass meadows M1.1	...	MFT1: Coastal saltmarshes and reedbeds MFT1.3	Total use resident ecosystem assets	Exports - intermediate services	Total Use by ecosystem assets	TOTAL USE
Selected ecosystem services (reference list)																																								
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Use Table

Selected ecosystem services (reference list)		
Provisioning services		
	Biomass provisioning	Crop provisioning
		Grazed biomass provisioning
		Livestock provisioning services
		Aquaculture provisioning service
		Wood provisioning services
		Wild fish and other natural aqua biomass provisioning services
		Wild animals, plants and other biomass provisioning services
	Genetic material services	
	Water supply	
	Other provisioning services	
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 attentuation services	
	Pollination services	
	Biological control services	
	Nursery population & habitat maintenance services	
	Other regulating and maintenance services	
Cultural services		
	Recreation-related services	
	Visual amenity services	
	Education, scientific and research services	
	Spiritual, artistic and symbolic services	
	Other cultural services	

Selected ecosystem services (reference list)			UNITS OF MEASURE	Selected industries: Agriculture	Forestry	Fisheries	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and remediation activities	EFG of the IUCN Global Ecosystem Typology): ...	T7	...	F1	...	FM1	M1	...	MFT1	Total use resident ecosystem assets	Exports - intermediate services	Total Use by ecosystem assets	TOTAL USE
													Derived semi-natural pastures and old fields	Permanent upland streams		Intermittently closed and open lakes and lagoons	Seagrass meadows		Coastal saltmarshes and reedbeds				
											...	...	T7.5	F1.1	...	FM1.3	M1.1	...	MFT1.3				
Provisioning services																							
	Biomass provisioning	Crop provisioning																					
		Grazed biomass provisioning																					
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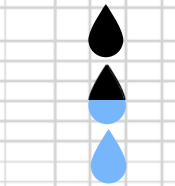
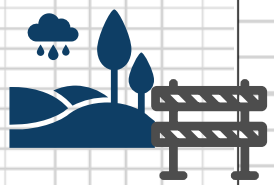
	Other cultural services																						





Use Table

USE			UNITS OF MEASURE	Selected economic units: 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 use by resident economic units	Exports - final ecosystem services	Total Use by economic units	Selected ecosystem types (based on Level 3 - EFG of the IUCN Global Ecosystem Typology): Terrestrial T1 Tropical-subtropical forests: Tropical-subtropical lowland rainforests T1.1	Tropical-subtropical dry forests and scrubs T1.2	Tropical-subtropical montane rainforests T1.3	Tropical heath forests T1.4	Terrestrial T2 Temperate-boreal forests and woodlands: Boreal and temperate high montane forests and woodlands T2.1	Deciduous temperate forests T2.2	...	Temperate pyric sclerophyll forests and woodlands T2.6	...	...	...	Derived semi-natural pastures and old fields T7.5	Freshwater F1: Permanent upland streams F1.1	...	Intermittently closed and open lakes and lagoons FM1.3	Marine M1: Seagrass meadows M1.1	...	Coastal saltmarshes and reedbeds MFT1.3	Total use resident ecosystem assets	Exports - intermediate services	Total Use by ecosystem assets	TOTAL USE
Selected ecosystem services (reference list)																																							
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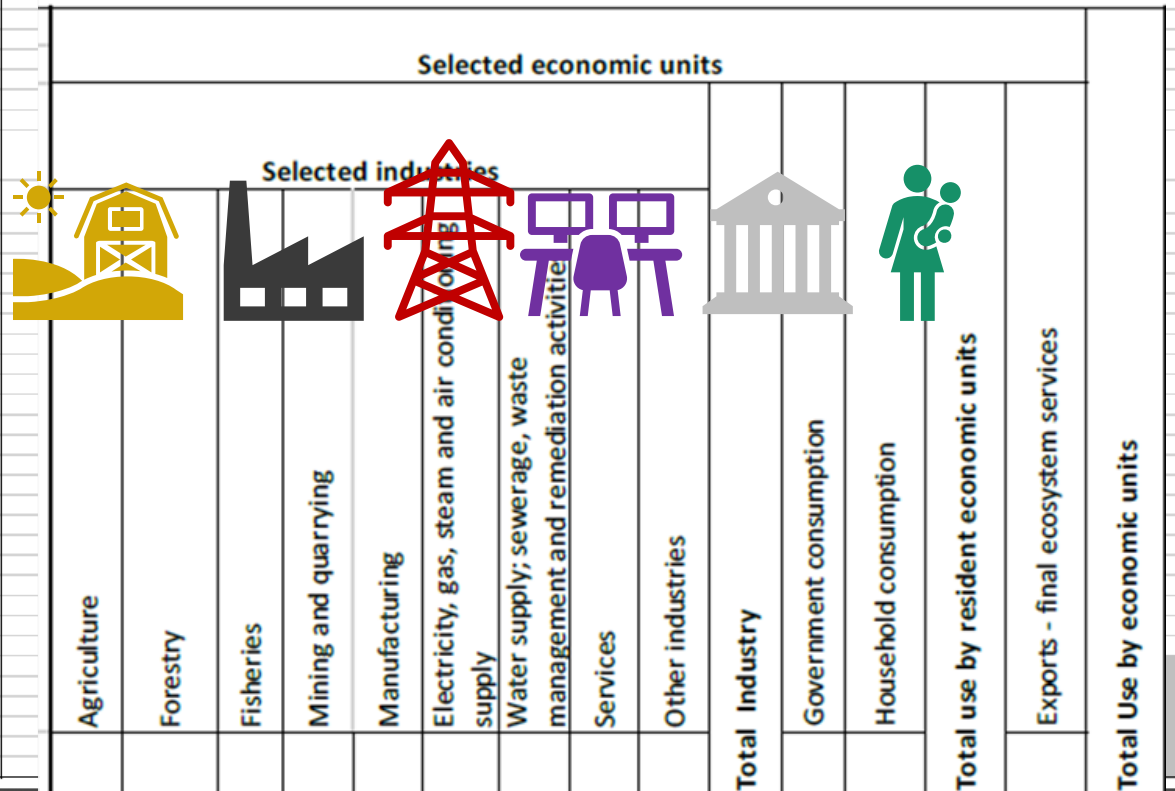

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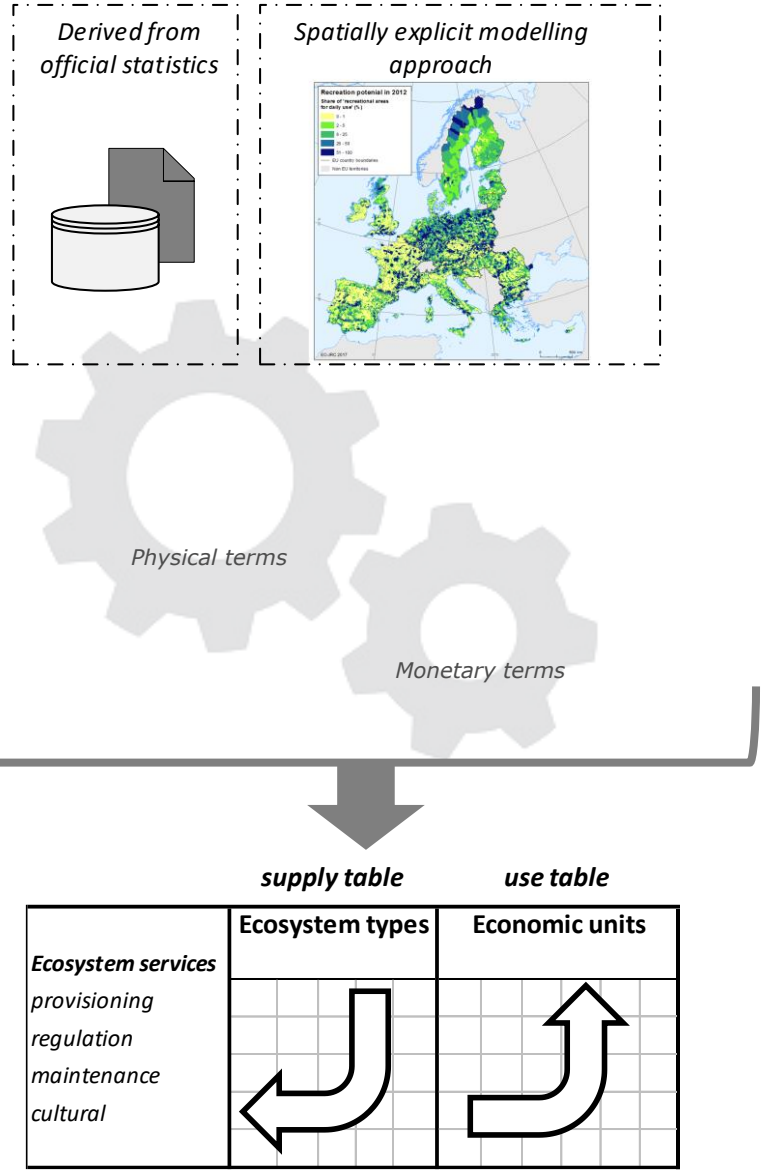
Methodology for the assessment

Summary of the nine ES assessed in INCA with respect to the degree of complexity. Colors represent: easy (green); relatively easy (yellow); relatively complex (orange); complex (red). A fast-track approach indicates green cells in both biophysical assessment and monetary evaluation

Ecosystem services	Biophysical assessment	Monetary valuation
Crop provision	Modelling ratio to be applied to existing raw data	Adapted market price: dataset available (no need for modelling)
Timber provision	Raw data already available (no need for modelling)	Market price: dataset available (no need for modelling)
Crop pollination	Modelling ratio to be applied to existing raw data	Adapted market price: dataset available (no need for modelling)
Soil retention	Modelling raw data without spatial flow dependency	Replacement cost and market price: moderate processing
Flood control	Modelling raw data with spatial flow dependency	Avoided damage cost: need for modelling
Water purification	Modelling raw data with spatial flow dependency	Replacement cost: need for modelling
Carbon sequestration	Raw data already available (no need for modelling)	Carbon rates: dataset available (no need for modelling)
Habitat and species maintenance	Modelling raw data without spatial flow dependency	Choice Experiment: need for modelling
Nature-based recreation	Modelling raw data without spatial flow dependency	Travel cost method: need for modelling



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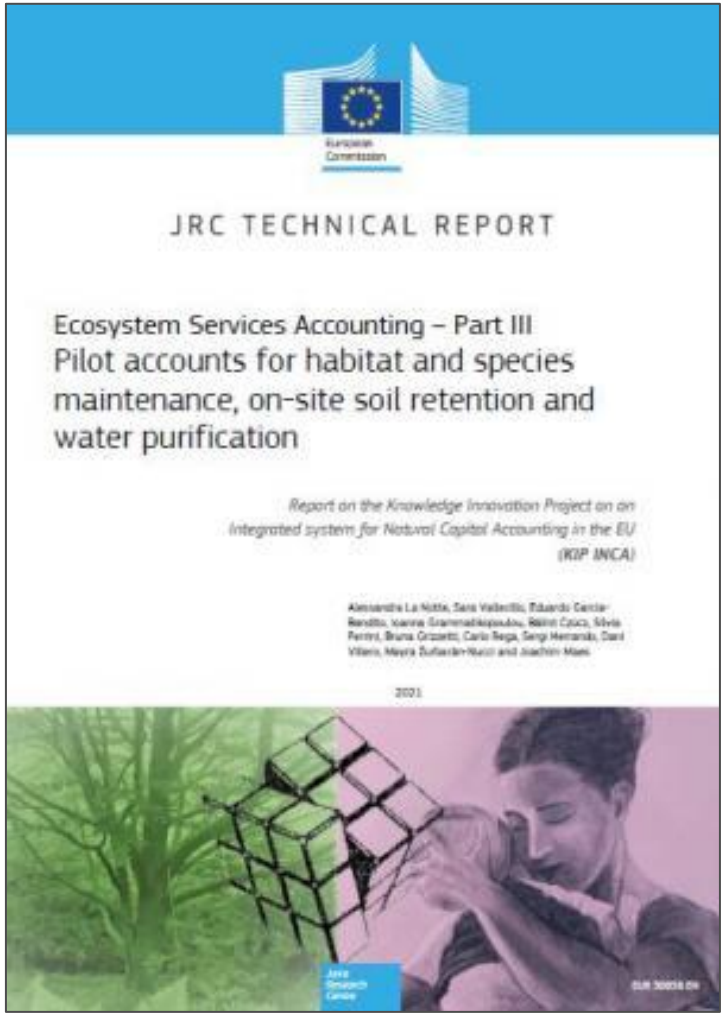
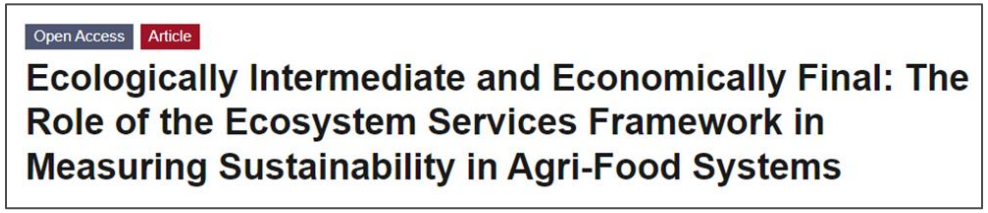
Sources for the examples: INCA project





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Thank you