



System of  
Environmental  
Economic  
Accounting

# Key requirements of ecosystem service classification for ecosystem accounting

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Expert Group Meeting – Towards a Standard International Classification of Ecosystem Services

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United Nations

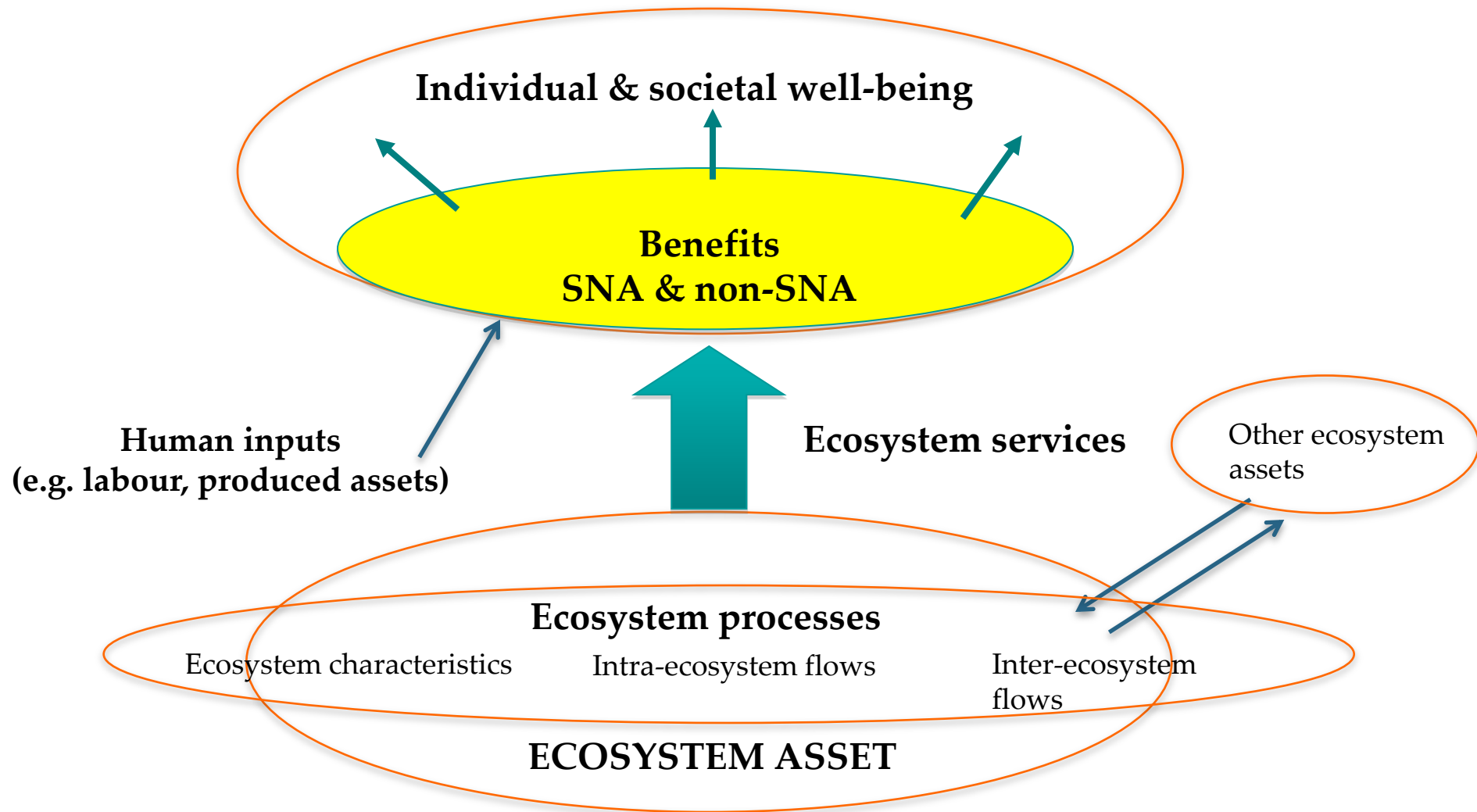
# Outcome of this meeting

- Short-term goal
  - > Clear advice to compilers and users about the roles of different ecosystem services classification (CICES, FECS, NESCS) for the compilation of the ecosystem accounts (Day 1 discussion)
- Medium-term goal
  - > Discussion and agreement of the key criteria, principles and structure for a classification on ecosystem services (Day 1-2 discussion)
  - > Agreement on the process and next steps towards the development of a standardized (or a combined system of) multipurpose international classification on ecosystem services (Day 2 discussion)

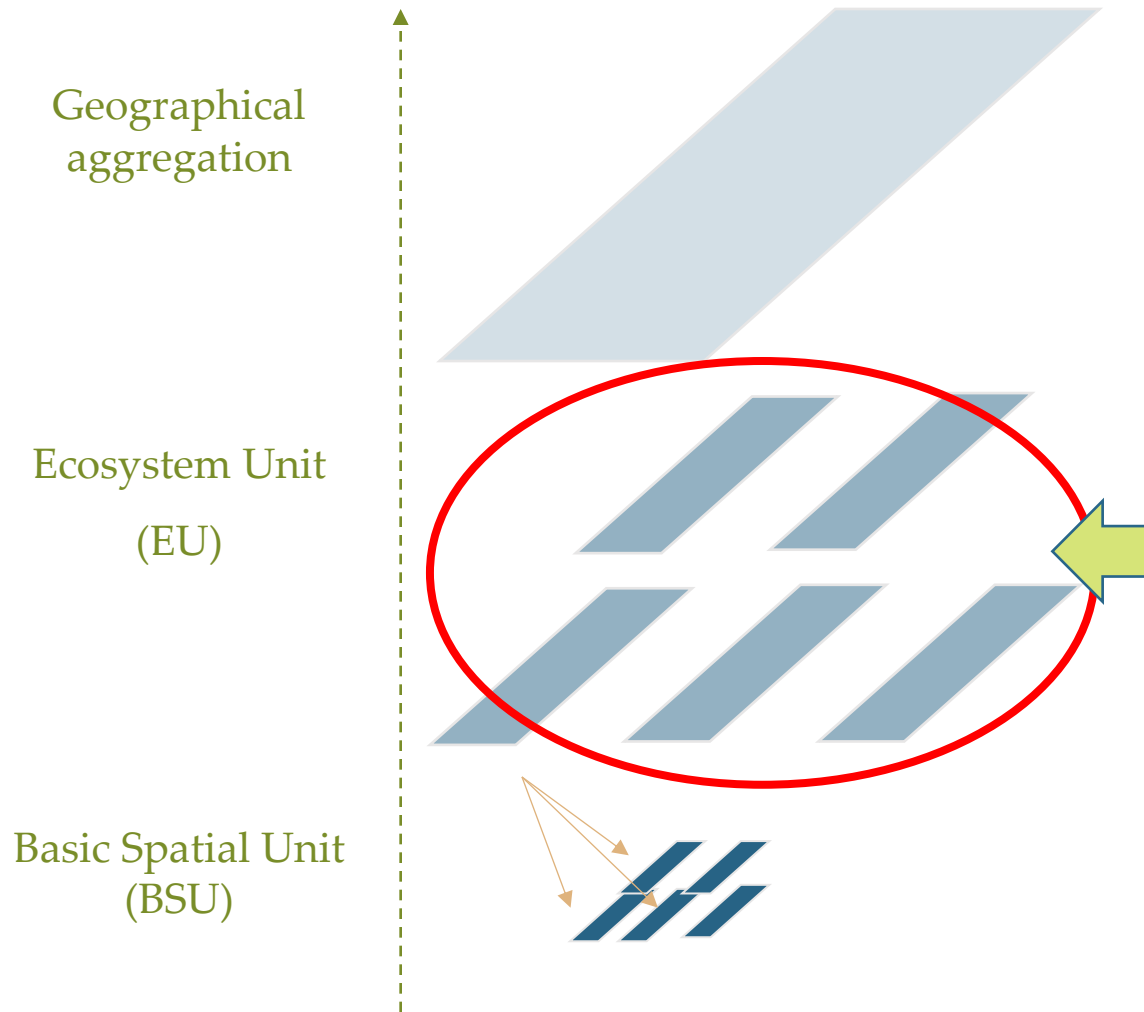
# Purpose of this session

- Discuss the key requirements of ecosystem services classification to be used for the compilation of the various accounts in the SEEA-EEA
  - > What does an accounting system require
  - > What is presently missing

# Ecosystem Accounting model



# Statistical units

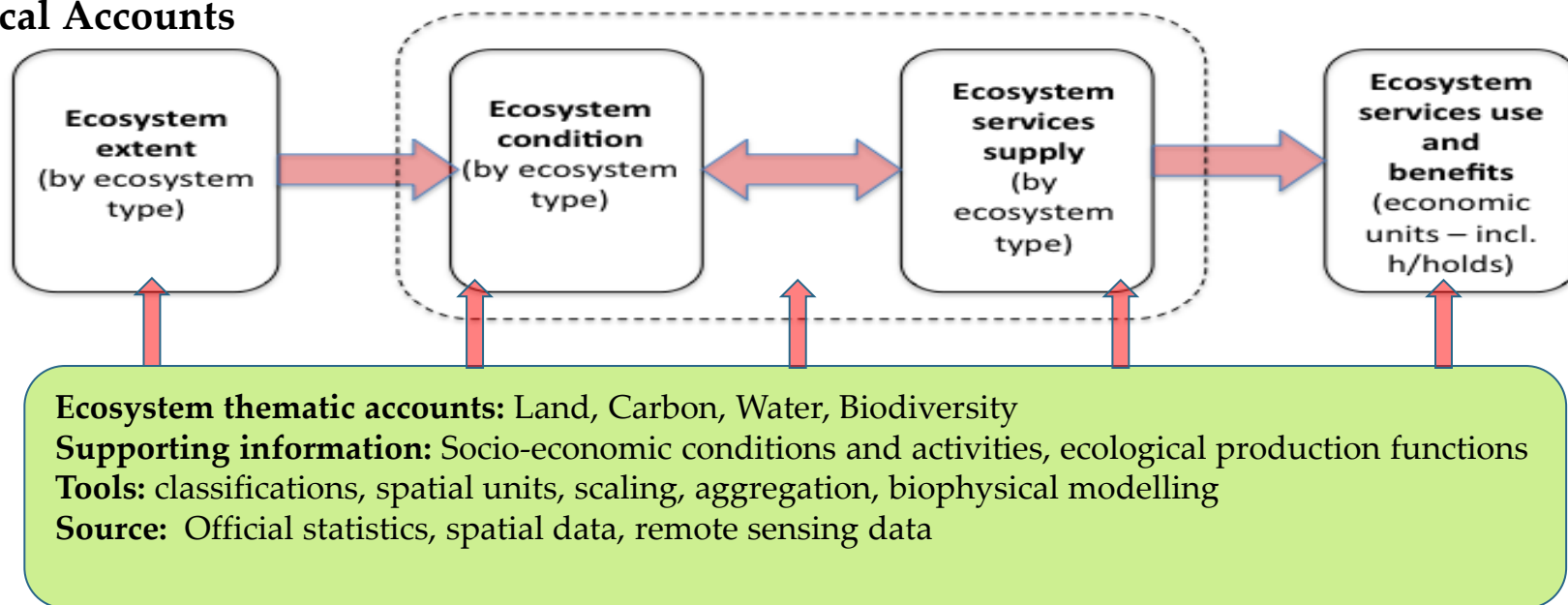


## Ecosystem units

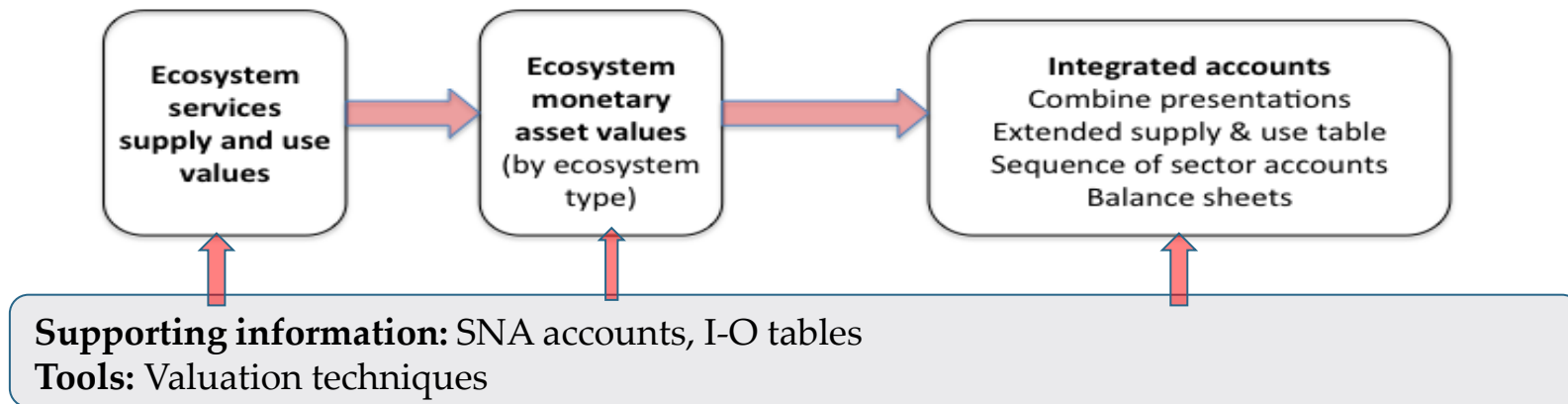
- Spatial areas that form the conceptual base for accounting and the integration of relevant statistics.
- Delineation is based on ecological characteristics
- Where various ecological data are not available, a land cover based delineation can be used as a starting point

# Broad steps in ecosystem accounting

## a. Physical Accounts



## b. Monetary Accounts



# Ecosystem extent account

	Type of Ecosystem Unit															
	Artificial surfaces	Herbaceous crops	Woody crops	Multiple or layered crops	Grassland	Tree-covered areas	Mangroves	Shrub-covered areas	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow and glaciers	Inland water bodies	Coastal water and inter-tidal areas	Sea and marine areas	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Opening extent</b>																
Additions to extent																
Managed expansion																
Natural expansion																
Upward reappraisals																
Reductions in extent																
Managed regression																
Natural regression																
Downward reappraisals																
Net change in extent																
<b>Closing extent</b>																

# Ecosystem condition account

(End of accounting period)

Type of Ecosystem Unit	Ecosystem characteristics						
	Vegetation	Water resources	Soil	Carbon	Biodiversity	Air	...
Artificial surfaces							
Herbaceous crops							
Woody crops							
Multiple or layered crops							
Grassland							
Tree-covered areas							
Mangroves							
Shrub-covered areas							
Regularly flooded areas							
Sparse natural vegetated areas							
Terrestrial barren land							
Permanent snow and glaciers							
Inland water bodies							
Coastal water and inter-tidal areas							
Sea and marine areas							



# Ecosystem services supply and use table

ECOSYSTEM SERVICES SUPPLY TABLE

	UNITS	Type of economic unit							Type of Ecosystem Unit							TOTAL SUPPLY					
		Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Imports	1 Artificial surfaces	2 Herbaceous crops	3 Woody crops	4 Multiple or layered crops	5 Grassland	6 Tree-covered areas	7 Mangroves		8 Shrub-covered areas	9 Regularly flooded areas	10 Sparse natural vegetated areas	11 Terrestrial barren land	12 Permanent snow and glaciers
<b>Ecosystem services</b>		<b>A</b>							<b>B</b>												
Provisioning services																					
Regulating services																					
Cultural services		<b>C</b>							<b>D</b>												
<b>Products</b>																					

ECOSYSTEM SERVICES USE TABLE

	UNITS	Type of economic unit							Type of Ecosystem Unit							TOTAL USE					
		Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Exports	1 Artificial surfaces	2 Herbaceous crops	3 Woody crops	4 Multiple or layered crops	5 Grassland	6 Tree-covered areas	7 Mangroves		8 Shrub-covered areas	9 Regularly flooded areas	10 Sparse natural vegetated areas	11 Terrestrial barren land	12 Permanent snow and glaciers
<b>Ecosystem services</b>		<b>E</b>							<b>F</b>												
Provisioning services																					
Regulating services																					
Cultural services		<b>G</b>							<b>H</b>												
<b>Products</b>																					



# Measurement of ecosystem services

- Because of the ambition to integrate measures of ecosystem services with the standard national accounts, the measurement scope and definition of ecosystem services in the SEEA EEA is defined in the context of the SNA production boundary.
- Rationale
  - > Economic production (for example in agriculture, forestry and fisheries) utilizes inputs directly taken from ecosystems but these inputs are not recorded in the standard accounting framework. In these situations, the logic of the SEEA EEA, is that ecosystem services should be differentiated from the goods and services that are produced. Thus, the ecosystem services represent the contribution of the ecosystem to the production of those goods and services
  - > There are many benefits that economic units, and society more generally, receive from functioning ecosystems, and that a full and proper accounting would incorporate this production of services by ecosystems, and the consumption of them in economic and human activity.

# Distinguishing ecosystem services and benefits

- The SEEA EEA accounting model makes a clear distinction between ecosystem services and the benefits to which they contribute. From an accounting perspective, the distinction is meaningful since it
  - > allows description of the relationship between final ecosystem service flows and existing flows of products currently recorded in the SNA
  - > recognizes the role of human inputs in the production process and that the contribution of final ecosystem services to benefits may change over time (e.g. due to changes in the methods of production)
  - > helps in identifying the appropriate target of valuation
- Cultivated biological resources, such as crops, plantation timber and aquaculture, are considered benefits as a combination of final ecosystem services and human inputs

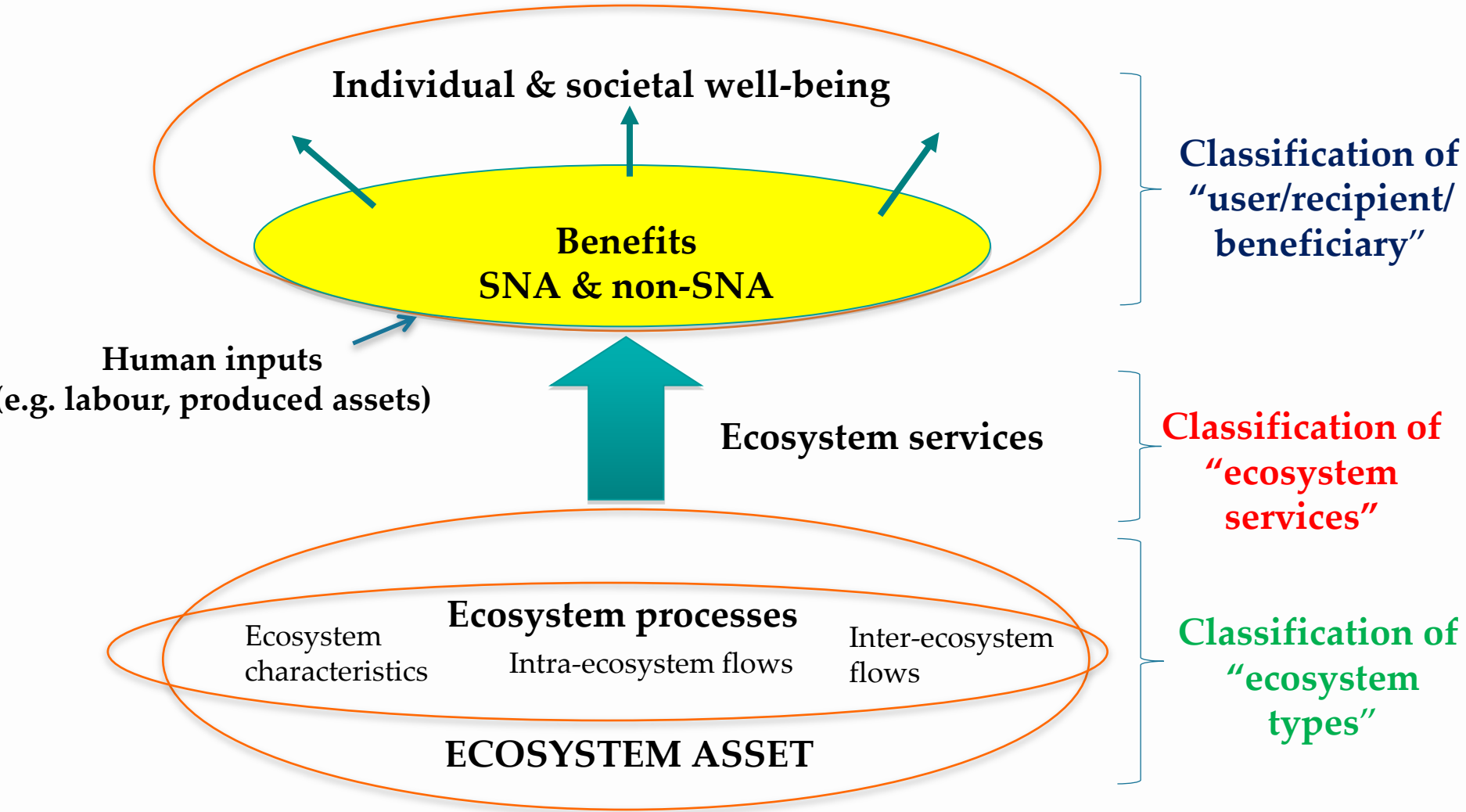
# Distinguishing final and intermediate ecosystem services

- The focus for ecosystem accounting is on final ecosystem services as contributions to the production of benefits
- The distinction between final and intermediate services reflects the principles of national accounting where aggregate production is measured by netting out flows along the supply chain. This ensures that double counting of outputs that become inputs to subsequent production is removed.
- On intermediate service
  - > while there is a recognition of the potential to record intermediate ecosystem services reflecting flows between ecosystem assets that supports a better conceptualisation of the connections between ecosystem assets,
  - > there is the practical reality that there are a very large number of potential intermediate services. Consequently, it is not anticipated that ecosystem accounting at this stage would focus on these flows.
- The recording of intermediate services would seem most useful for the purposes of supplying management information. In aggregate, at national level, it is likely that most intermediate services will offset each other, since ultimately their value is embodied in final ecosystem services

# Role of classifications for SEEA EEA

- Establish the relevant measurement concepts and then use classifications to provide the detail to analyze these concepts and collect information.
  - > It may be that discussion of classifications helps to define the measurement boundaries for a given concept
  - > but, in the final phase, the concept and associated measurement boundary must be set first before a classification can be finalized.
  - > In the situation here, we need an agreed definition/boundary for ecosystem services and then a classification can be established which, in effect, identifies different types of ecosystem services within the agreed boundary.
- Three distinct classifications are relevant for ecosystem accounting
  - > Ecosystem types (presently missing/not well developed)
  - > Ecosystem services
  - > User/recipient/beneficiary (presently missing/not well developed)

# Three distinct classifications for ecosystem accounting



# Ecosystem extent account

Classification of  
"ecosystem types"

	Type of Ecosystem Unit															
	Artificial surfaces	Herbaceous crops	Woody crops	Multiple or layered crops	Grassland	Tree-covered areas	Mangroves	Shrub-covered areas	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow and glaciers	Inland water bodies	Coastal water and inter-tidal areas	Sea and marine areas	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
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<b>Closing extent</b>																



# Ecosystem condition account

(End of accounting period)

## Classification of ecosystem types

Type of Ecosystem Unit	Ecosystem characteristics						
	Vegetation	Water resources	Soil	Carbon	Biodiversity	Air	...
Artificial surfaces							
Herbaceous crops							
Woody crops							
Multiple or layered crops							
Grassland							
Tree-covered areas							
Mangroves							
Shrub-covered areas							
Regularly flooded areas							
Sparse natural vegetated areas							
Terrestrial barren land							
Permanent snow and glaciers							
Inland water bodies							
Coastal water and inter-tidal areas							
Sea and marine areas							

# Ecosystem services supply table

(focus on quadrant B)

Classification of ecosystem types

Classification of ecosystem services

	UNITS	Type of economic unit							Type of Ecosystem Unit								TOTAL SUPPLY				
		Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Imports	1	2	3	4	5	6	7	8		9	10	11	12
<b>Ecosystem services</b> Provisioning services Regulating services Cultural services		A							B												
<b>Products</b>		C							D												

# Ecosystem services use table (focus on quadrant E)

Classification of ecosystem types

Classification of "user/recipient/beneficiary"

Classification of ecosystem services

Ecosystem services  
Provisioning services  
Regulating services  
Cultural services

Products

UNITS	Type of economic unit							Type of Ecosystem Unit								TOTAL USE								
	Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Exports	Artificial surfaces	Herbaceous crops	Woody crops	Multiple or layered crops	Grassland	Tree-covered areas	Mangroves	Shrub-covered areas		Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow and glaciers	Inland water bodies	Coastal water and inter-tidal areas	Sea and marine areas	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15									
<b>E</b>																								
<b>G</b>																								

# Classification of ecosystem types

- Recognizing that ecosystem assets are quasi-producing units in the ecosystem accounting framework then a classification of different types of producing units is needed
- No agreed international classification on ecosystem types
- SEEA EEA recommended that delineation of ecosystem units should be based on ecological characteristics . Wherever various ecological data are not available, a land cover based delineation, based on the Land Cover Classification System (LCCS), can be used as a starting point
- The classification of ecosystem types may not be a primarily focus in this meeting, but this is a related issue that require further exploring.
- Could CICES, FECS-CS or NESCS shed insight

# Land cover classes

Description of classes
Artificial areas (including urban and associated areas)
Herbaceous crops
Woody crops
Multiple or layered crops
Grassland
Tree-covered areas (forests)
Mangroves
Shrub-covered areas
Shrubs, and/or herbaceous vegetation, aquatic or regularly flooded
Sparsely natural vegetated areas
Terrestrial barren land
Permanent snow and glaciers
Inland water bodies
Coastal water bodies and intertidal areas
Sea and marine areas

# Classification of ecosystem services

- In SEEA EEA, ecosystem services are the “production/output” of ecosystem assets
- All types of ecosystem services could be lumped together without distinction in the same way as all products (goods and services) from production by economic units could be grouped together
- The purpose is to record different types of ecosystem services and this is the role of the classification.
- For each (final) ecosystem service there must be an associated (and distinct) benefit and a corresponding beneficiary.

# Classification of “user/recipient/beneficiary”

- The production of (final) ecosystem services reflects a transaction between a producing ecosystem asset on the one hand and a recipient or user on the other.
- For “final ecosystem services” the user is an economic unit, household/individual or society generally.
- To support integration with the national accounts and its tables such as input-output tables, it is recommended that the matching of ecosystem services to beneficiaries use the classification of beneficiaries used by the national accounts, either by institutional sector or by industry/economic activity (ISIC). A convention to treat use by society as use by general government would be consistent with the SNA.

# Determine final ecosystem services

Key points to consider

- What is the nature of the contribution of the ecosystem – ie. what did the ecosystem do to produce the services that is reflected in the transaction between the ecosystem asset and the recipient?
- To what extent is the ecosystem service already captured in the existing production recorded in the SNA?
  - > Treating something that is already included in the SNA production boundary as ecosystem services (e.g. crops) could be considered double counting



# Questions to discuss

- Recognize and define the similarities and differences between a FINAL ecosystem services classification (FEGS-CS and NESCS) and CICES and how these differences dictate how the possible outcomes of using the different approaches
- Clarify the boundaries between thinking of ecosystem services and benefits and thinking of final ecosystem services and beneficiaries (or users).
- What are the definitions and roles of final ecosystem services (and/or FEGS) and intermediate services.
- Explain the expectations concerning the nature of the relationship between ecosystem assets, ecosystem services stocks and flows of ecosystem services

# Questions to discuss

- Define and discuss the nature of ecological production functions (Ecol-PF) and economic production functions (Econ-PF)
- Describe the assumption concerning the development of ecosystem services based on MA IV classes and the EPA approach
- Measurability of ecosystem services and how to determine the priority ecosystem services for measurement
- Better describe the link between biodiversity, carbon sequestration and ecosystem services – how do CICES and FEGS/FES treat them
- Better define/describe cultural services

# Link between biodiversity and ecosystem services

- The perspective taken for ecosystem accounting in the SEEA EEA is that biodiversity is a feature most directly relevant in measurement of the condition of ecosystem assets.
- At the same time, it is recognised that there are some aspects of biodiversity, especially species diversity, that can supply final ecosystem services (e.g, the value of recreational services from wildlife related activities)
- Specific elements of biodiversity (e.g. related to the conservation of species) could be considered representing a 'final use' of biodiversity
- It is relevant to recognise that measures related to biodiversity may be appropriate indicators in the ecosystem services supply and use tables

# Regulatory services

- For regulating services, there are generally no direct human inputs consumed in the production of benefits. Consequently, the quantity of final ecosystem services may be equal to the quantity of the benefit
  - > E.g. carbon sequestration services supplied by a forest.
- However, in other cases, there is a distinction between final services and benefit.
  - > E.g. in the case of air filtration services, the benefit is reduced risk (to the local population) of respiratory and cardio-vascular diseases through cleaner air. The ecosystem service in this example is the capture of air-borne pollutants.
- Challenge
  - > How to identify beneficiary when there is no “transaction” take place (e.g flood prevention)
  - > How to appropriately describe the ecosystem service such that the focus of measurement is appropriate.
  - > Should ecosystem process (i.e. what is the ecosystem doing) be considered as ecosystem services?

# Cultural services

- Many cultural services are in fact benefits. since these broad categories emerged from the MA in which ecosystem services equaled benefits.
- Often, cultural services are conceptualised in terms of the benefits that people receive from the engagement and hence the challenge for ecosystem accounting is to distinguish the contribution that represents the ecosystem service among the various benefits.

**THANK YOU**

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<http://unstats.un.org/unsd/envaccounting>

# Key requirements

- Commonly understood and agreed definitions for ecosystem services in consistent with the SEEA-EEA framework
- Agreed boundary for ecosystem services in consistent with the SEEA-EEA framework
- Then a classification can be established which, in effect, identifies different types of ecosystem services within the agreed boundary.
  - Ecosystem services
  - Benefit

- 
- Measurable

# Requirement

- International comparability
- Collect and organized information in a standard way
- Aggregate and disaggregate data sets in a meaningful way for complex analysis
- Support policy and decision making