



Experimental Ecosystem Accounting (EEA): Introduction

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SEEA-Experimental Ecosystem Accounting - Background

- Complements SEEA Central Framework with focus on ecosystems perspective
- Developed as part of broader process of revising SEEA 2003
- Integrated system of information on distinct stocks and flows
- Not a statistical standard but synthesizes current knowledge related to ecosystem services, ecosystem condition and related concepts
- “Experimental” because significant methodological challenges remain and further testing of concepts needed



Relationship to SEEA Central Framework

- Extends range of flows (production boundary) for accounting compared to SNA and SEEA in physical and monetary terms
- Many flows from Central Framework also included in Experimental Ecosystem Accounting (e.g. flows of timber), but extension of EEA is to attribute flows to spatial areas
- Some Central Framework natural input flows are excluded from Experimental Ecosystem Accounting (e.g. mineral and energy resources)



Interdisciplinary Approach

- Conceptual model in ecosystem accounting draws from:
 - Ecology
 - Economics
 - National accounts
 - Statistical measurement



Why ecosystem accounts?

- Information for tracking changes in ecosystems, such as degradation
- Information for linking those changes to human activities and human well-being
- Extends the scope of our information for analysis of impacts on the environment (and, thus, ultimately, on societies)
- Information on ecosystem services and the trade-offs/co-benefits involved



What is an ecosystem?

dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit

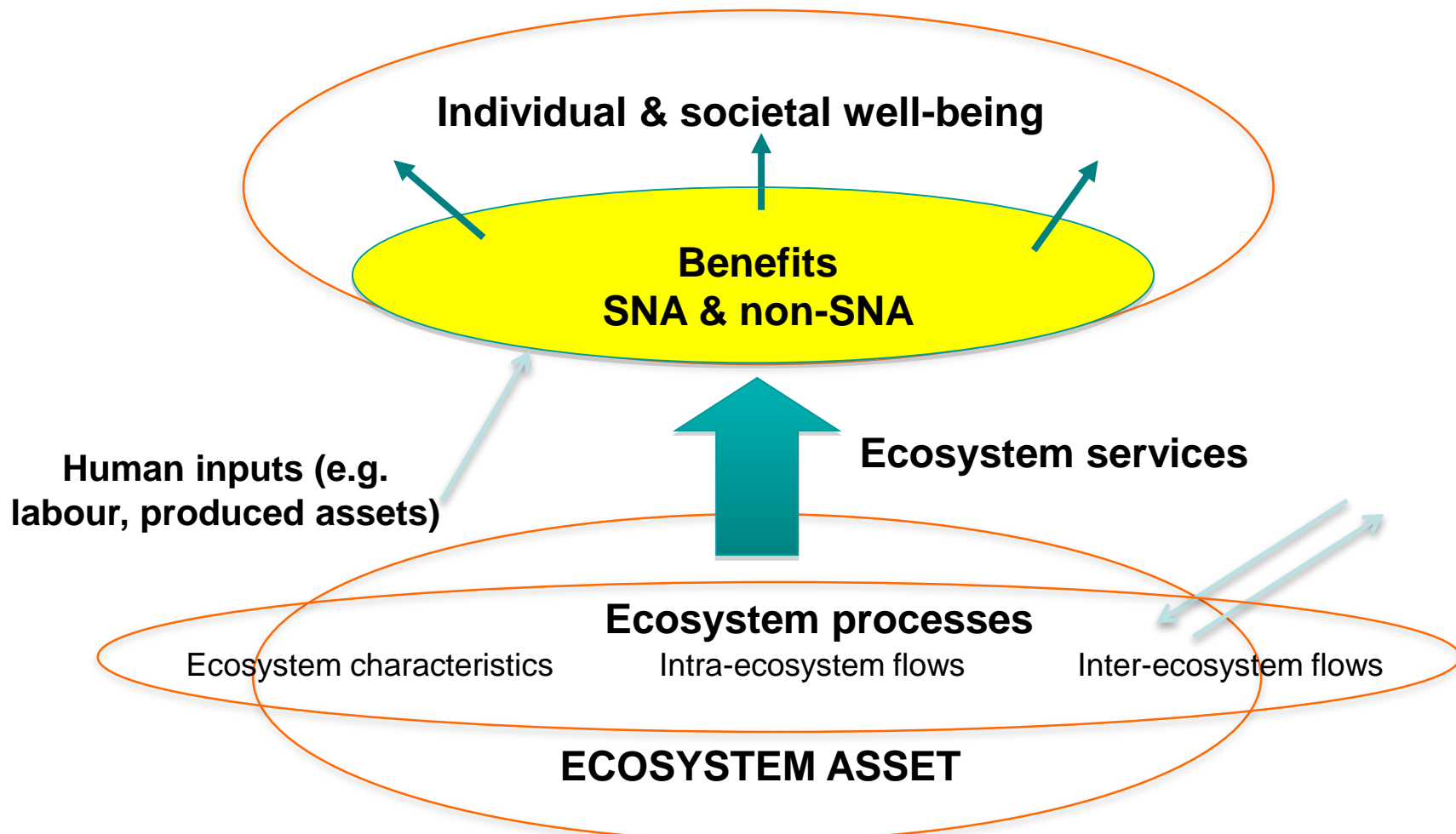
-UN Convention on Biological Diversity

■Note:

- Definition is independent of spatial scale
- Ecosystems are inevitably interconnected or overlapping
- Thus, the scale of analysis depends on the relationships we want to study , which, for ecosystem accounting, is primarily the relationships/flows between ecosystems and societies



Ecosystem Services as Flows From Ecosystem Assets





Ecosystem Assets

- Spatial area comprised of characteristics that are fundamental to analysis of ecosystems, such as:
 - Stocks and changes in stocks measured from 2 perspectives: ecosystem condition and ecosystem extent
 - “Operational” characteristics of an ecosystem asset
 - Structure (e.g. food web)
 - Composition (biotic and abiotic components)
 - Processes (e.g. photosynthesis)
 - Functions (e.g. resilience)
- Contrast with “individual resources”

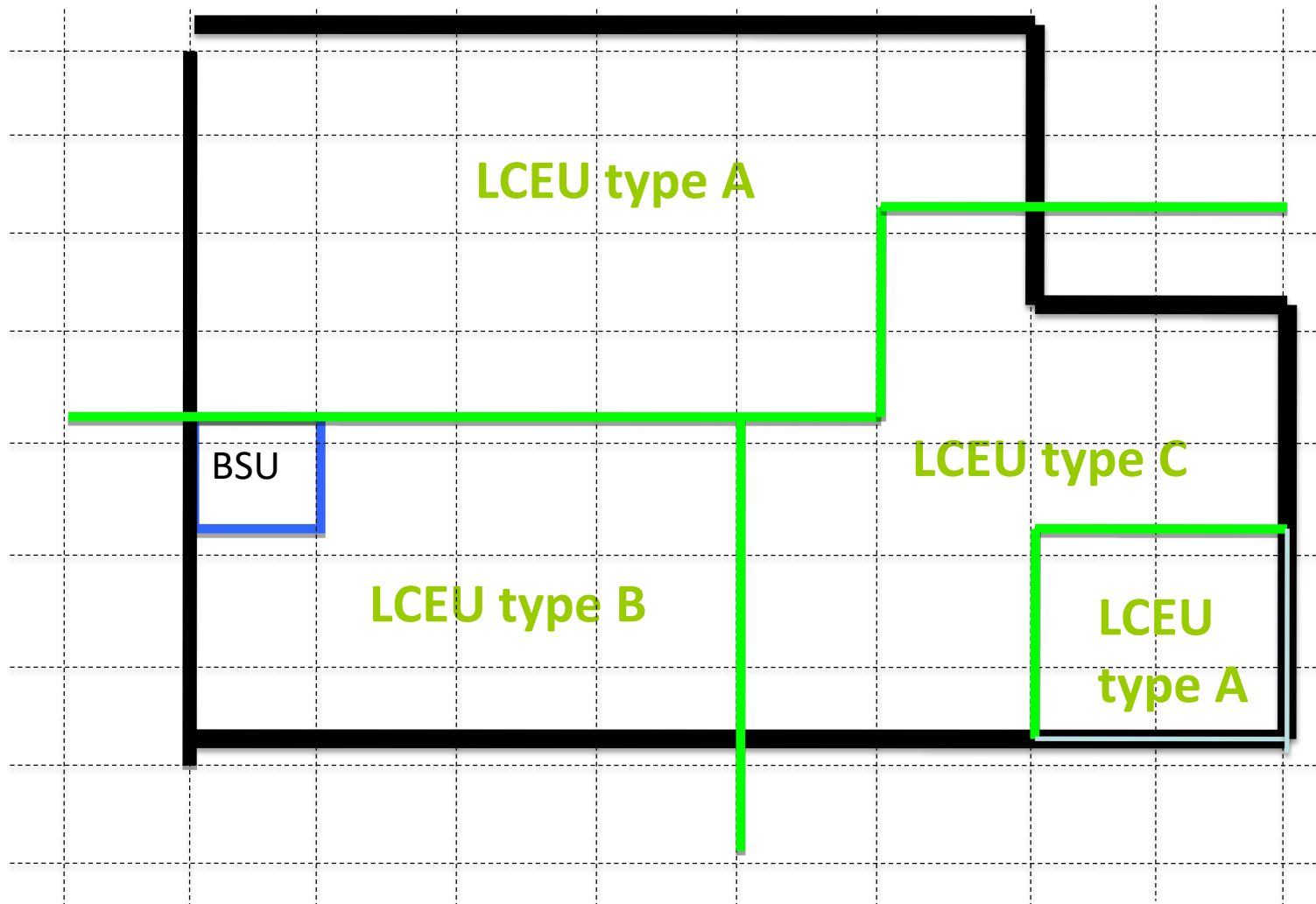


Spatial unit

- Statistical units of ecosystem accounting are spatial areas
- 3 different types:
 - Basic spatial units (BSU)
 - Land cover/ecosystem functional units (LCEU)
 - Provisional classification provided in EEA
 - Ecosystem accounting units (EAU)
 - Based on purpose of analysis



Ecosystem Accounting Unit





Ecosystem Condition

- Overall quality of an ecosystem asset, in terms of its characteristics
 - Land cover
 - Biodiversity
 - Spatial extent
 - Soil type
 - Freshwater
 - Altitude and slope
 - Climate

- Condition (along with ecosystem extent) reflects changes to expected future flows of ecosystem services (capacity)

- Many possibilities for suitable indicators of condition

- Need to prioritize most relevant characteristics first



Table 2.1 Provisional Land Cover/Ecosystem Functional Unit Classes

Description of classes
Urban and associated developed areas
Medium to large fields rainfed herbaceous cropland
Medium to large fields irrigated herbaceous cropland
Permanent crops, agriculture plantations
Agriculture associations and mosaics
Pastures and natural grassland
Forest tree cover
Shrubland, bushland, heathland
Sparsely vegetated areas
Natural vegetation associations and mosaics
Barren land
Permanent snow and glaciers
Open wetlands
Inland water bodies
Coastal water bodies
Sea



Land cover account

- Equivalent to land cover account in SEEA Central Framework (Chapter 5)

Table 4.1 Physical account for land cover (hectares)³⁹

	Artificial surfaces	Crops	Grassland	Tree covered area	Mangroves	Shrub covered area	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow, glaciers and inland water bodies	Coastal water and inter-tidal areas
Opening stock of resources	12 292.5	445 431.0	106 180.5	338 514.0	214.5	66 475.5	73.5	1 966.5		12 949.5	19 351.5
Additions to stock											
Managed expansion	184.5	9 355.5									
Natural expansion			64.5								1.5
Upwards reappraisals			4.5	181.5							
Total additions to stock	184.5	9 355.5	69.0	181.5							1.5
Reductions in stock											
Managed regression			4 704.0	3 118.5	9.0	1 560.0	1.5				
Natural regression					1.5	64.5					
Downwards reappraisals						4.5					
Total reductions in stock			4 704.0	3 118.5	10.5	1 629.0	1.5				
Closing stock	12 477.0	454 786.5	101 545.5	335 577.0	204.0	64 846.5	72.0	1 966.5		12 949.5	19 353.0



Ecosystem Services

“are the contributions of ecosystems to benefits used in economic and other human activity”

- “Contributions” because ecosystem services can be combined with other inputs (e.g. economic infrastructure) to provide benefits

- In some cases the contributions may be equivalent to the benefit (where there are negligible other inputs)

- Not all flows from the environment are ecosystem services
 - Excludes extracted minerals
 - Presence of human beneficiaries necessary



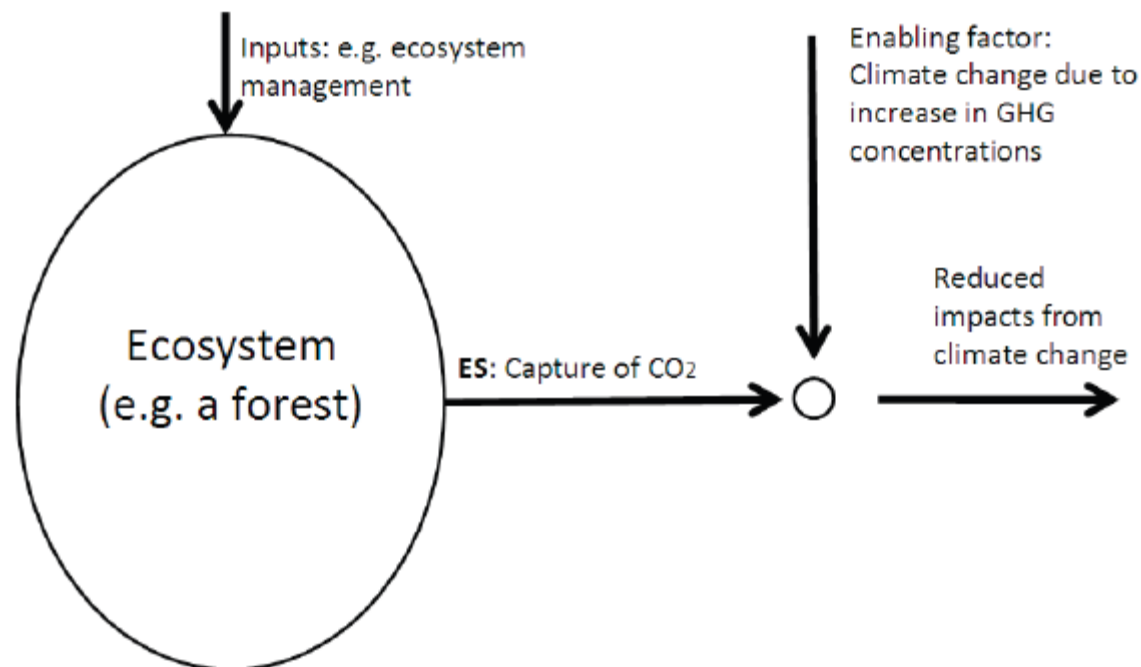
Ecosystem Service Types in SEEA- EEA

- Provisioning
 - Material and energy contributions generated by or in an ecosystem (e.g., wood for fuel)
- Regulating
 - Result from the capacity of ecosystems to regulate climate, hydrological and bio-chemical cycles, and other natural processes (e.g., flood control)
- Cultural services
 - Generated from physical settings, locations or situations which give rise to intellectual and symbolic benefits that people obtain from ecosystems through recreation, relaxation, and spiritual reflection (does not require use)



Regulating Service Example

Figure A3.4 Sequestering of carbon





Other Examples of Services and Their Benefits

Service example	Benefit example
Provisioning	
Fodder (grass, herbs, leaves, etc.)	Livestock products
Freshwater	Crops
	Drinking water
Fish	Fish
Regulating	
Carbon sequestration	Climate regulation
Air filtration by vegetation	Cleaner air
Ecosystem regulation of water and soil erosion flows (e.g. landslide protection)	Protection of lives and property
Cultural	
Ecosystems provide attractive spaces and landscape features	Recreation



Example Ecosystem Service (flow) Accounting

	Type of LCEU								
	Ag	Urban	Forest	Wetlands	...				
Type of ecosystem services (by CICES)									
Provisioning services									
Regulating services									
Cultural services									



Areas for Development in EEA

- Investigating spatial unit approach and “scaling up” and aggregation
- Testing of models and tools for measuring ecosystem services and characteristics of ecosystem condition
- Testing of classifications and measurement boundaries within the conceptual model (especially CICES and land classifications)



Research agenda

- Development of SEEA Experimental Ecosystem Accounting as a synthesis of developments across disciplines
- Short development timeframe that did not aim to resolve all conceptual and methodological issues
- Material presented to UNSC in February 2013
 - Draft SEEA Experimental Ecosystem Accounting
 - Draft Research agenda highlighting the need for continued testing and research
- Current requirement to determine
 - Priority areas
 - Appropriate mechanisms, resources and links to related projects



Key aspects of the research agenda

- Must be multi-disciplinary
 - Not aiming at discipline specific measurement improvement (although these are important)
- Must aim to cover multiple ecosystem types
- Must incorporate both conceptual work and testing of definitions and methods
- Must integrate effectively with existing projects and new initiatives
- Should link with research agenda for the SEEA Central Framework and be associated with implementation of the SEEA Central Framework



Priority #1: Spatial units

- Delineating appropriate spatial units and associated classification is central to effective progress
- Units model generally accepted but is a blend of many perspectives and needs to be tested
- Extensions to consider marine areas and the atmosphere are needed
- Important to consider optimal links to geo-referencing of socio-economic data
- Links to defining classifications for land use and land cover are important



Priority area #2: Methods for measuring ecosystem services and assets

- Concepts and definitions described in SEEA Experimental Ecosystem Accounting
- Less obvious exactly how to generate the data
- Key considerations
 - How to determine the most important services and characteristics (don't focus on only the measurable)
 - Linking physical flows of ES to beneficiaries
 - Advancing development of classifications
 - Determining reference/benchmark conditions
 - Incorporating measures of biodiversity
 - Variation in methods across ecosystem type



Priority area #3 : Presentation and structure

- Concepts and methods need to be developed in the context of disseminating information
- Accounting structures are only indicative in the SEEA Experimental Ecosystem Accounting text
- Key considerations
 - Matching information requirements to concepts and methods
 - Approaches to linking ecosystem data to socio-economic data
 - Development of different dissemination techniques especially maps
 - Articulation of potential indicators



Priority #4: Linking to socio-economic data

- SEEA's objective is to bring environmental and economic information together
- Challenge to ensure that the spatial scales used to compile ecosystem related data are aligned with those used for socio-economic data
- Many developments on geo-referencing socio-economic data underway
- Objective here is to examine ways to harness these developments and associated techniques around big data for use in accounting situations
- Close links needed to delineation of spatial units



Priority area #5: Valuation of ecosystem services

- This topic has much momentum in many places
- Text of SEEA Experimental Ecosystem Accounting highlights some important considerations from an accounting perspective
- Important to engage with economists to reach common understanding of potential methods and relevant assumptions
- Important links also to developments at the corporate level in integrating values of ecosystem services in business accounting



- Accounting concepts
 - Degradation – valuation and allocation
 - Integration of ecosystem values into standard accounts and balance sheets (links to wealth a/c)
 - Treatment of expenditures on ecosystems (incl PES)
- Connections between ecosystem services and ecosystem condition
 - Often seen as competing approaches
 - SEEA EEA sees clear links but they are complex and non-linear
- Aggregation and ecosystem-wide indicators
 - Most challenging aspect: needs to build and combine all other research and testing work

Medium to longer term priorities



Management and governance proposals

- Recognise multi-agency requirements and harnessing existing knowledge
- Steering committee under the auspices of the UNCEEA responsible for:
 - Coordinate and the advancement of the research agenda on the basis of lessons learnt from testing with the objective of developing best practices and in the longer term mainstreaming
 - Drafting practical guidance on how to
 - Organizing Forum of Experts (yearly)
 - Building connections and networks and putting SEEA_Experimental Ecosystem Accounting on the agenda of other groups
 - Identification of research and testing opportunities
 - Future international conference (every 3 years)



Testing the SEEA Experimental Ecosystem Accounting

- Initial stages
- Meeting next week in NY, co-organized with Australia, Norway, UNEP, CBD, TEEB, the World Bank
- Focus on biodiversity, carbon and water ecosystems
- Map what tools and models are being used for what purpose



Thank You!

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