SEEA: CONCEPTS IN EXPERIMENTAL ECOSYSTEM ACCOUNTING

Joint UNSD/UNDP/UNEP/World Bank/EEA Seminar

"Towards Linking Ecosystems and Ecosystem Services to Economic and Human Activity"

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BLENDING UNDERLYING CONCEPTS

- Conceptual model in ecosystem accounting formed from established concepts in
  - Ecology
  - Ecological economics
  - National accounts
  - Statistical measurement

- Measuring the economy is complex because of the many interactions within individual economic units, the many interactions between economic units, because economic units operate at multiple scales (local, national, global), and because economic units exhibit a high degree of variation in their structure over differing time scales.

- Measuring ecosystems is complex because of the many biophysical interactions within individual ecosystems, the many interactions between ecosystems, because ecosystems operate at multiple scales (local, national, global), and because ecosystems exhibit a high degree of natural variation over differing time scales.
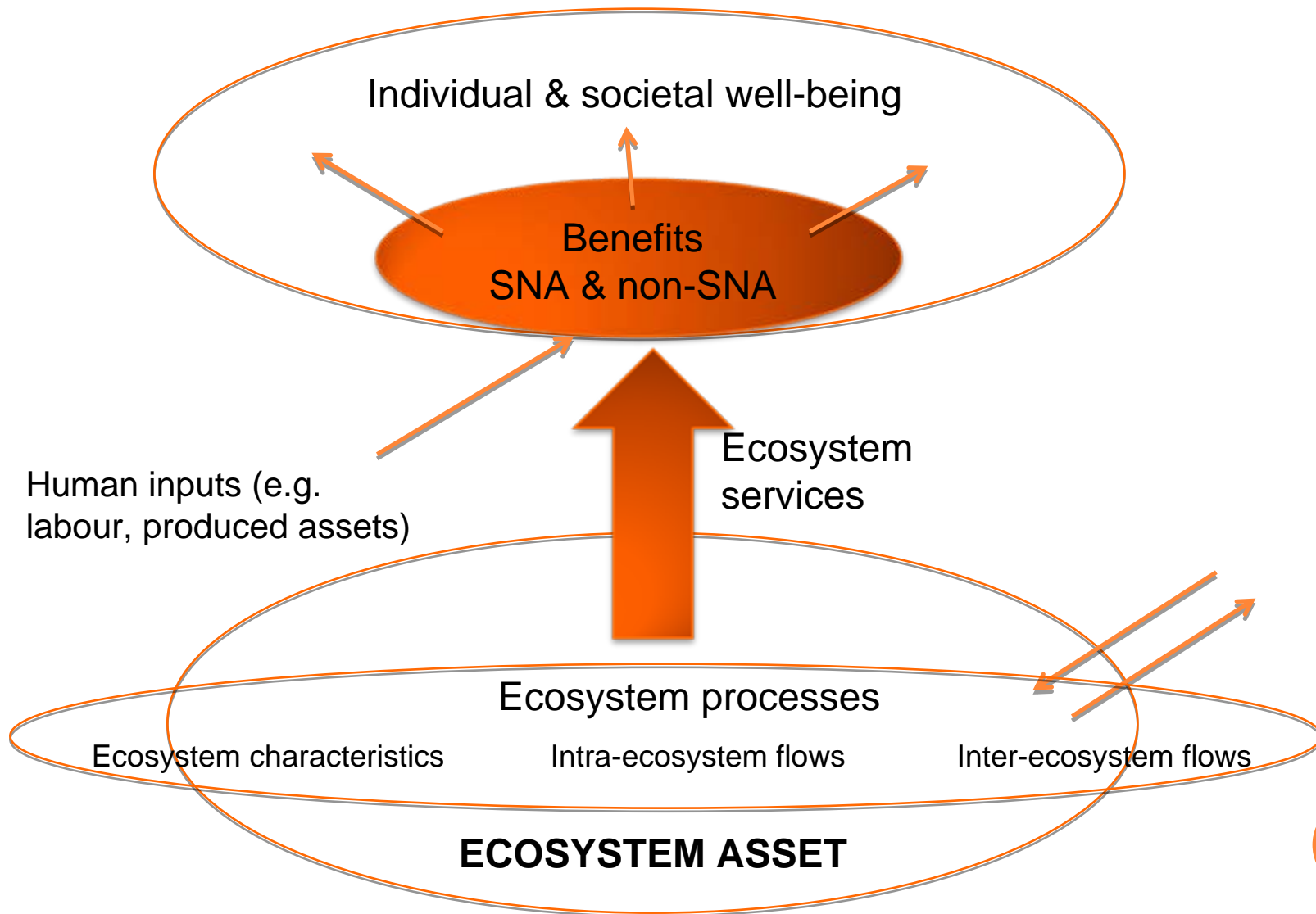
WHAT IS AN ACCOUNTING APPROACH?

- Accounting is founded on defined relationships between stocks and flows

- The conceptual relationships and associated measurement boundaries are present in physical and monetary terms

- Derivation of aggregates is an outcome of defined relationships and the use of common measurement units

- Within measurement boundaries, accounts are comprehensive and internally consistent

- Key measurement boundaries relate to scope of assets and the flows from those assets
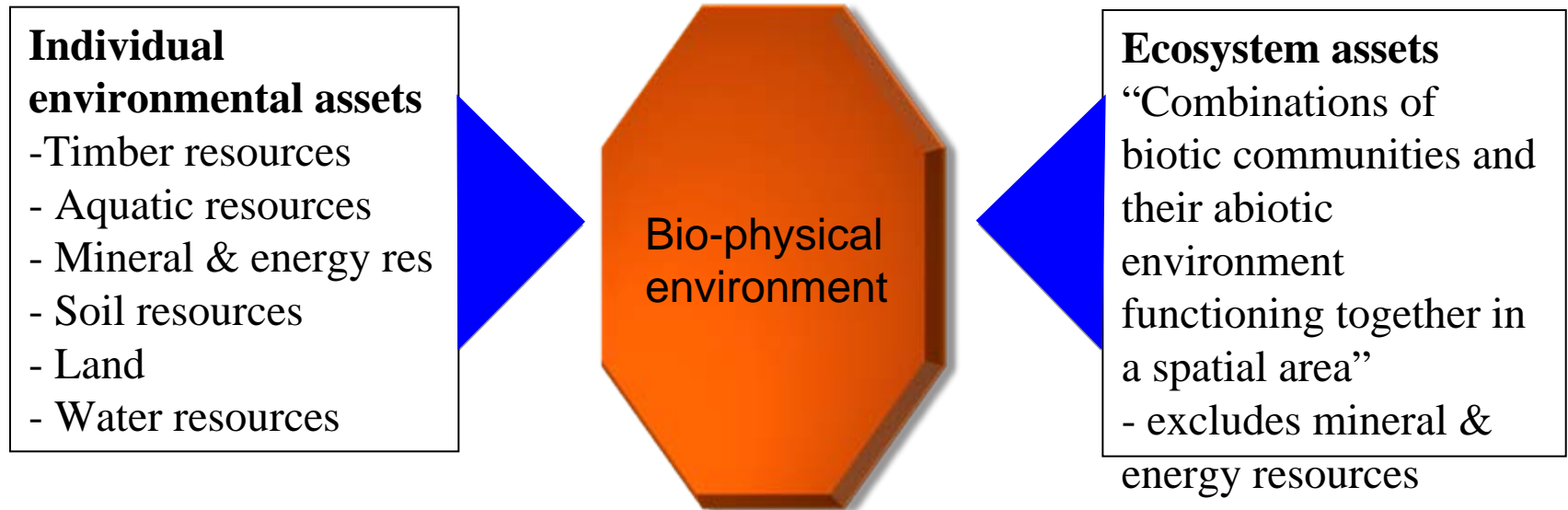
CORE ECOSYSTEM ACCOUNTING MODEL

Individual & societal well-being

Benefits
SNA & non-SNA

Human inputs (e.g. labour, produced assets)

Ecosystem services

Ecosystem processes

Ecosystem characteristics   Intra-ecosystem flows   Inter-ecosystem flows

ECOSYSTEM ASSET

ECOSYSTEM ASSETS

○ Two perspectives on environmental assets

Individual environmental assets
-Timber resources
- Aquatic resources
- Mineral & energy res
- Soil resources
- Land
- Water resources

Bio-physical environment

Ecosystem assets
"Combinations of biotic communities and their abiotic environment functioning together in a spatial area"
- excludes mineral & energy resources

CHARACTERISTICS OF ECOSYSTEM ASSETS

- Ecological characteristics
  - Structure (e.g. food web)
  - Composition (biotic and abiotic components)
  - Processes (e.g. photosynthesis)
  - Functions (e.g. resilience)

- Characteristics of location
  - Extent (area of ecosystem)
  - Configuration (organisation of components)
  - Landscape form (e.g. mountains, coastal areas)

- Biodiversity

SPATIAL UNITS

Ecosystem Accounting Unit

LCEU type A

BSU

LCEU type B

LCEU type C

LCEU type A
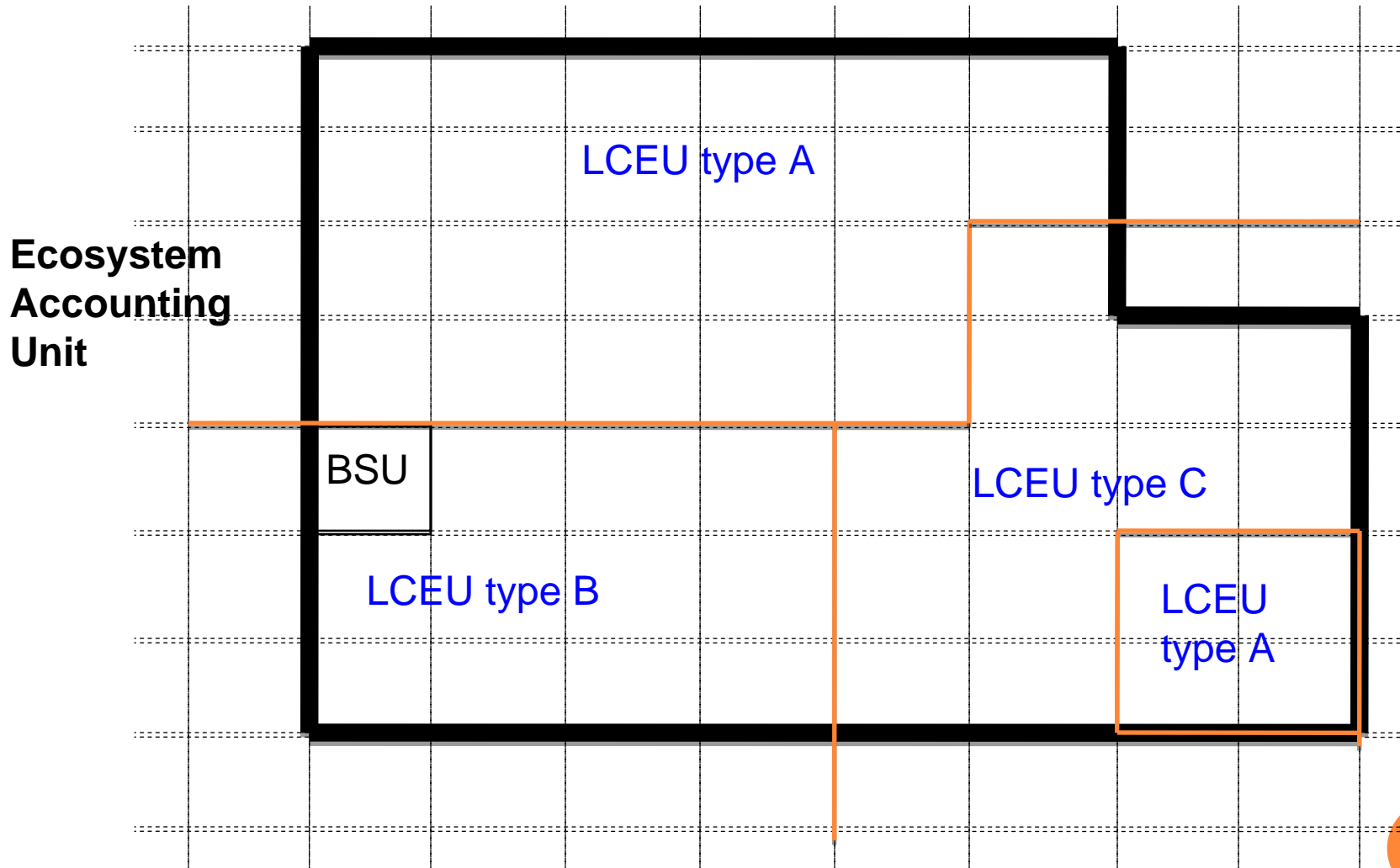
MEASURING ECOSYSTEM EXTENT AND CONDITION

- Extent measured as changes in areas and/or changes in composition

- Changes in ecosystem condition reflect changing characteristics / functioning / "performance" of the ecosystem asset

- Relevant characteristics (and associated indicators) will vary with the ecology and location of the area
  - Vegetation – canopy cover, leaf area index, change in biomass
  - Biodiversity – species richness, relative abundance
  - Soil – soil organic matter content, soil carbon, groundwater table
  - Water – river flow, water quality (SEEA-Water), fish species

USE OF REFERENCE CONDITIONS

- To provide a common base for the assessment of changes in different characteristics utilise a reference condition
- Conceptually, a useful reference condition is based on a common degree of human influence
- Distinguish
  - Reference condition
  - Actual condition
  - Target condition
- Combination of science and statistics determines reference and actual conditions.
- Target conditions are a matter of social choice.

MEASURING EXPECTED ECOSYSTEM SERVICE FLOWS

- Conceptual links to standard asset accounting but adaptations as well
  - Starting point is capital services from produced assets
  - Issues of multiple services, multiple users & regeneration
- Assume current basket of ecosystem services will continue
  - Basket will comprise a mix – e.g. for a forest there may be services from logging of timber, from air filtration, and from recreation
  - Basket relates to a particular use of an ecosystem asset
- Need to assess sustainability to determine asset life & expected future services
  - Assess condition relative to service flows
- Degradation, enhancement and conversion

LINKS TO SEEA CENTRAL FRAMEWORK

- Compilation of land accounts – land cover & land use
- Measurement of individual environmental assets as part of measuring ecosystem condition and ecosystem services
  - Water resources, Timber, fish and other biological resources, Soil resources
- Combined presentations
  - Link information on environmental pressures (e.g. flows of natural inputs, energy and water use, flows of air emissions and solid waste) to any associated environmental impacts (e.g. changes in ecosystem condition and extent)
  - Link responses (environmental protection expenditure, taxes and subsidies) to ecosystem changes

AREAS FOR DEVELOPMENT

- Improved understanding of ecosystem processes in specific ecosystems to enable assessment of overall condition and articulation of ecosystem services, and intra- and inter- ecosystem flows.

- Aggregation methods within and across ecosystems to derive overall measures of ecosystem condition and ecosystem services

- Derivation and interpretation of ecosystem degradation

AREAS FOR DEVELOPMENT

- Testing of methods and options for measuring ecosystem services and ecosystem condition
  - Focus on scientific standards including selection of indicators and determination of reference conditions and general data and methodological quality

- Testing of classifications and measurement boundaries within the conceptual model (especially CICES and land classifications)

KEY MESSAGES

- Conceptual model for ecosystem accounting brings together existing knowledge from a number of disciplines

- Clear convergence on relationships of interest and potential exists for using an accounting approach

- Proposed ecosystem accounting model straightforward at its core and provides a platform for testing and future research

- Distinction between stocks and flows central hence measurement of ecosystem condition & extent, and ecosystem service flows is required

- Many meaningful and useful indicators exist or could be collected and hence perceived "unmeasurability" is in part of function of available resources rather than conceptual complexity