

Ecosystem Accounting: Challenges and Opportunities

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Why ecosystem accounting?

Supplement conventional NA with the data on material, energy used and waste generated to produce economic goods (per unit of GDP) and assess resource depletion – in physical and monetary units (EEA, 2011).

- Target of EU Biodiversity Strategy 2020 (T.2)
- EU social and environmental equity (Beyond GDP -Stirlitz-Sen-Fitousi, 2009).

Challenges and opportunities

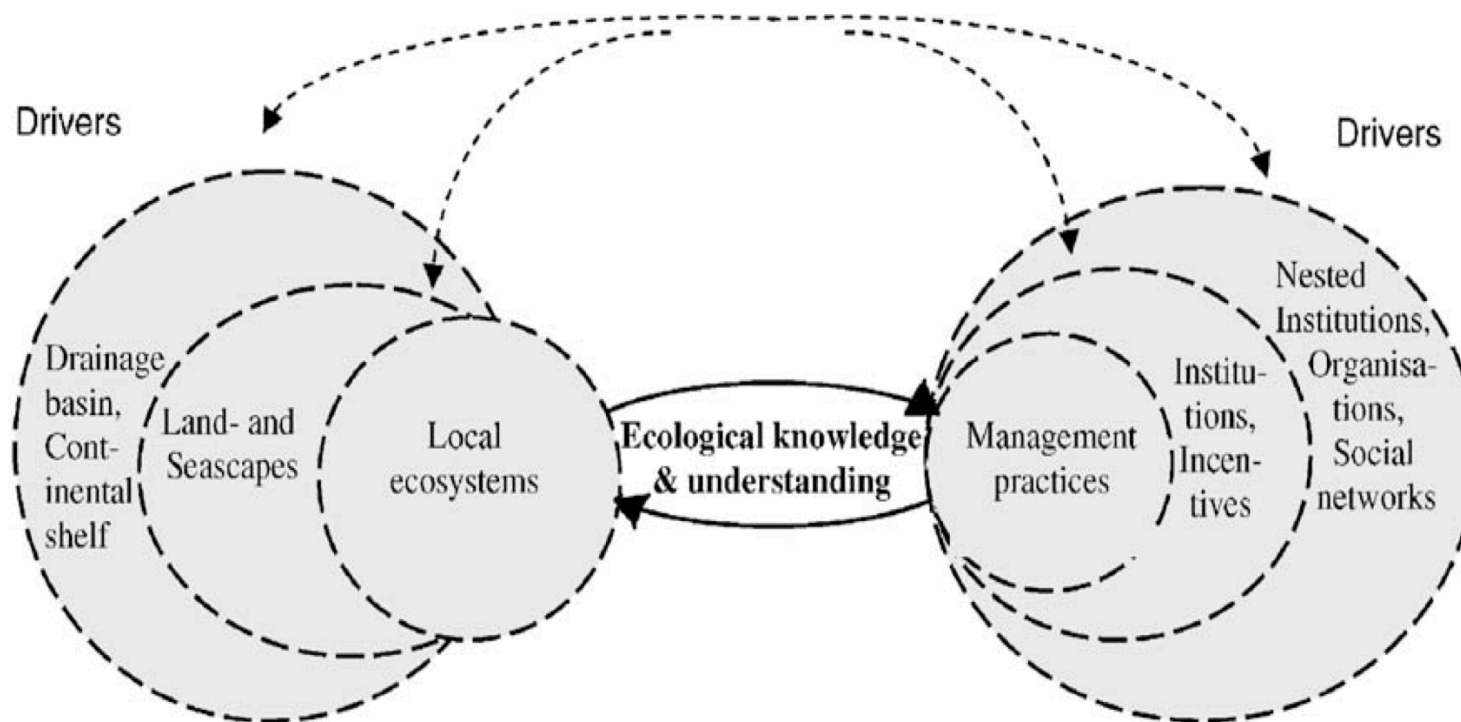
- Statistical units (hectars, joules, euros, etc.)
- Classifications
- Commodification of ecosystem services
- Design of policy instruments and evaluation of policy impacts at macro and micro level (decision making tool).



Statistical units

- Institutional units are typically enterprises, central or local government institutions or households.
- Equivalent units need to be defined for ecosystems.
- Scientific literature suggests that the best unit to assess ecosystems is the socio--ecological system (Gallopín, 1991, Folke et al., 2003, Glaser, 2008).

Socio-Ecological System (SES)

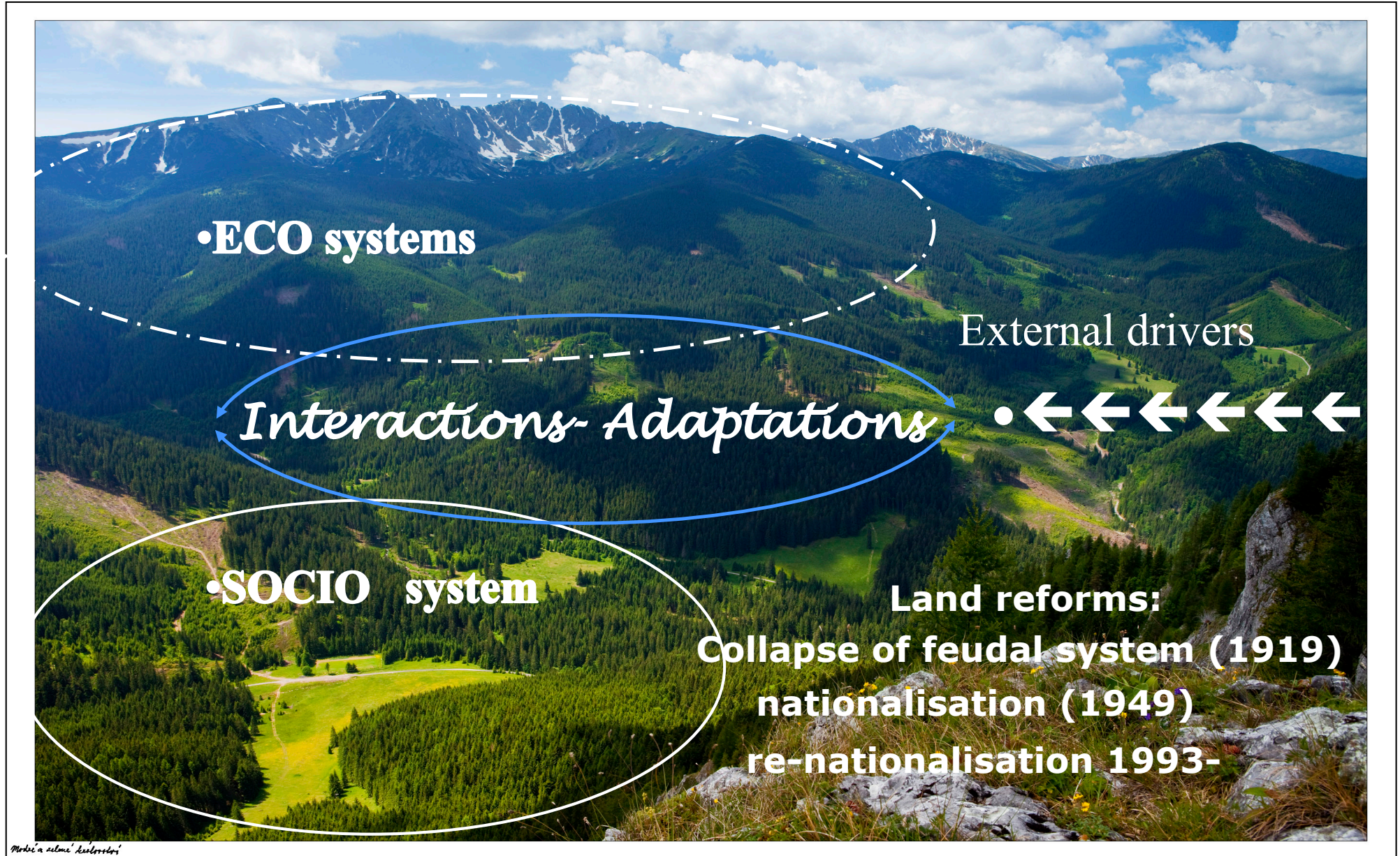


• Berkes F., Colding J., Folke C., eds. (2003). **Navigating Social-Ecological Systems: Building Resilience for Complexity and Change.** University Press.

Cambridge



Carpathian Forest as Socio-Ecological System



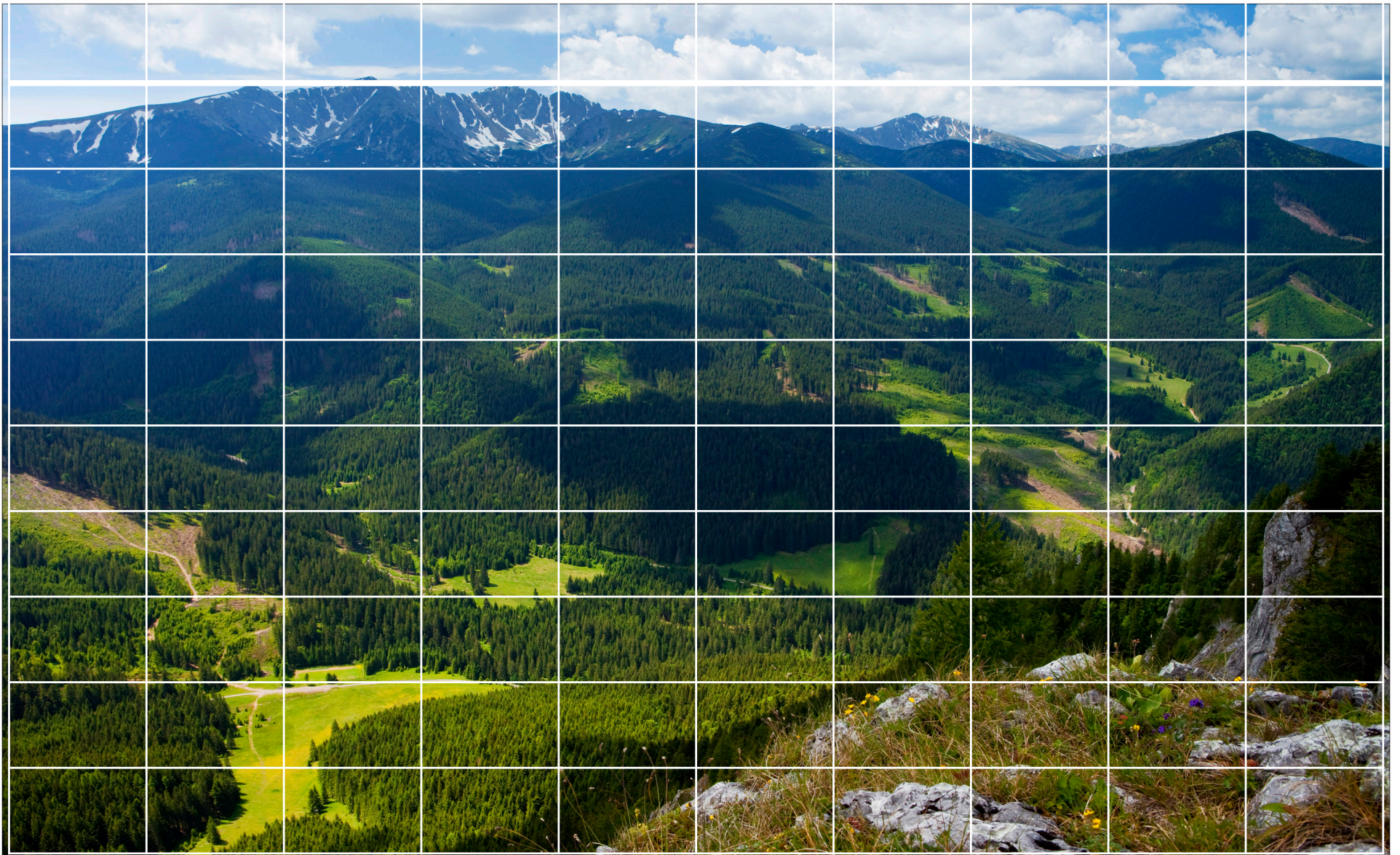
Classification: SES for ecosystem accounting

- **Land Cover Functional Units (LCFU)** is for inland ecosystems, the solution has been to analyse the biophysical characteristics of the landscapes
- **Socio-Ecological Landscape Units (SELU)** are produced in turn from LCFU, belonging to a river basin, or proximity to the sea.

GRIDS (Not statistical Unit)

- Highly important when combining data from very diverse sources (different scales or geographical breakdowns)
- Updating of physical data and accessibility of socio-economic data for a grid is questionable.

Carpathian Forest SES as GRID?



Commodification of Ecosystem Services

- introduced in 1981 - builds on earlier literature highlighting the societal value of nature's functions.
- In ecology - to refer to the set of ecosystem processes operating within an ecological system irrespective of whether or not such processes are useful for humans
- the rationale behind the use of the ecosystem- service concept -mainly pedagogic, and it aimed to demonstrate how the disappearance of biodiversity directly affects ecosystem functions that underpin critical services for human well-being
- the MA - human dependency not only on ecosystem services, but also on the underlying ecosystem functioning - the role of biodiversity and ecological processes in human well being.
- interest has grown in the design of Market Based Instruments to create economic incentives for conservation MBI, PES

Commodification and Ecosystem Services

- i) framing an ecological function as a service,
- ii) assigning it a single exchange-value and,
- iii) linking providers and users of these services in a market exchange.

Invisible Complexity

- itemizing ecosystem services for the purpose of monetary valuation, pricing and exchange - obscuring ecosystems' complexity establishing boundaries within ecosystems
- masks the fact that each ecosystem function is dependent upon others
- ES - complex - biotic and non-biotic components interact to produce such services - such components are also inter-connected
- primary and secondary productions - result of a multiplicity of factors - temperature, nutrients, and soil horizons –among physical variables– and species composition and co-evolution with humans — among biotic ones.
- The regulation of surface and groundwater flows - function of vegetal cover, species composition, type of soil, soil biota, and temperature, among others.
- global carbon markets - planting of certain tree species above others - changing current species richness and density, and disrupting water flows - may lead governments, private firms and landowners to invest preferably in tree plantations more than encouraging the restoration or conservation of complex tropical and sub-tropical ecosystems

Invisible Values

- assigning a single exchange-value, i.e. a monetary value and a price to an ecosystem service - a reductionist approach to our understanding of human-nature relationships
- beauty, the historical socio-ecological relations it inherently represents, the biodiversity it contains, or the importance it may have for future generations, among others
- the monetary valuation of all or some of its components may not be accepted

Invisible Institutional Asymmetries

- the inequalities underlying the access to these services, mediated through property rights and other institutional means.
- The attribution of property rights over ecosystem services - formal de jure rights over the ecosystems from which such services are derived define ownership over these services and permit to define contracts in the most efficient way, while acknowledging whose opportunity costs need to be met and separating rights to these services from broader rights to the forest and land
- inherent risk that these are defined by those with economic and social power and, consequently, legitimise a particular social order.

Policy instruments and impacts

Macro Analysis

- **Measure by means of CGE models**
 - **Computable general equilibrium (CGE)**
- actual economic data to estimate how an economy might react to changes in policy, technology or other external factors (e.g. **environmental quality**).

Policy instruments and impacts

Micro Analysis

- On the firm level or statistical units level allows for qualitative (decision made by management) and quantitative (prices of permits, costs, revenues, etc.) analyses.
- Evaluation of regional and sectoral policies (e.g. forestry, water management, biodiversity etc.) and to assess effect (impact) of changes in SESs (e.g. land use) to economic performance and ecosystem resilience.



Effect of long term land use and forest policy?

Thank you

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Effect of contradicting institutions?

