UNEP

Convention on Biological Diversity

SUBREGIONAL WORKSHOP FOR SUBSAHARAN WEST AFRICA ON VALUATION AND INCENTIVE MEASURES
Ouagadougou, Burkina Faso, 14–17 May 2013

ENVIRONMENTAL AND ECOSYSTEM ACCOUNTING

Ecosystem Capital Accounts: Principles and Framework

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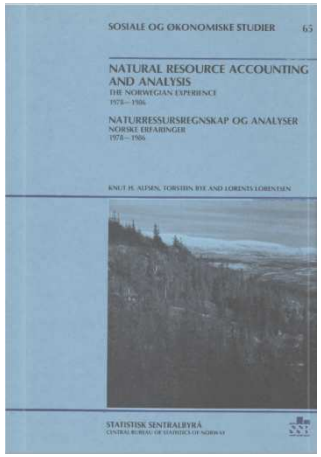
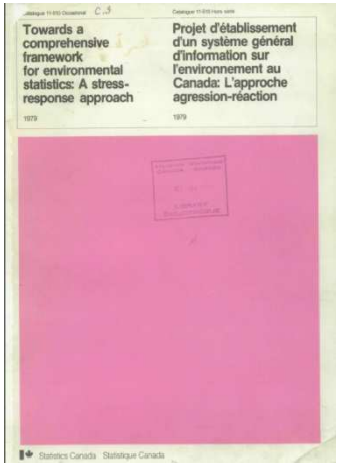
National Accounts:
Recurrent demands for improved economic indicators and aggregates

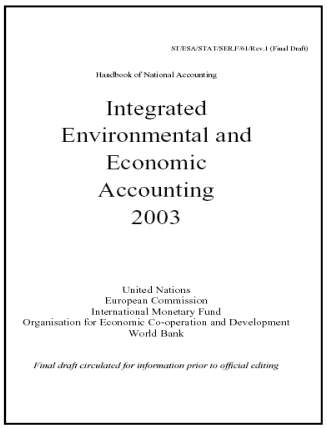
- Historical pioneer "green accounting" projects: Norway, Canada, France, Philippines, Indonesia, the Netherlands, Spain…
- Rio1992, Agenda 21
- UN SEEA1993 to "adjust" the UN System of National Accounts. SEEA revised in 2003
- New SEEA revision 2012/13, including now a special volume on ecosystem accounts and valuation
- Recent initiatives:
  - Beyond GDP Conference 2008
  - Potsdam 2008 G8+5 initiative and **TEEB**
  - Stiglitz/ Sen/ Fitoussi report on the measurement of economic performance 2009
  - New CBD Aishi-Nagoya Strategy 2010: demand for the inclusion of biodiversity and ecosystem value into national accounts
  - World Bank's new Global Partnership for "Green Accounting" and Ecosystem Valuation (WAVES)
  - References to environmental accounts for measuring progress in Green Economy, Green Growth, Resource Efficiency…
- Launch of the SEEA Part 1 at Rio+20
- In Europe, new Regulation on Environmental Accounts: Eurostat (the economy-environment interface) and the EEA (ecosystem capital accounts)

(very incomplete) history of early works…



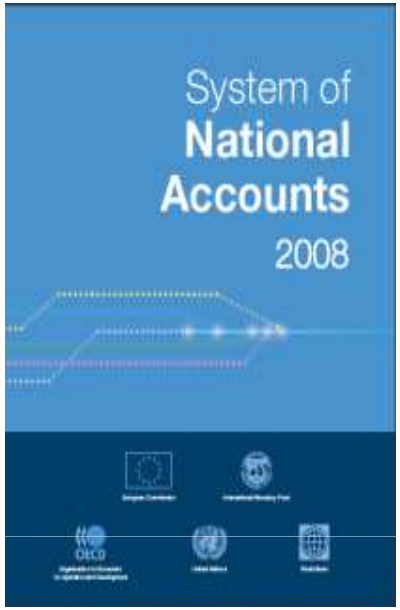


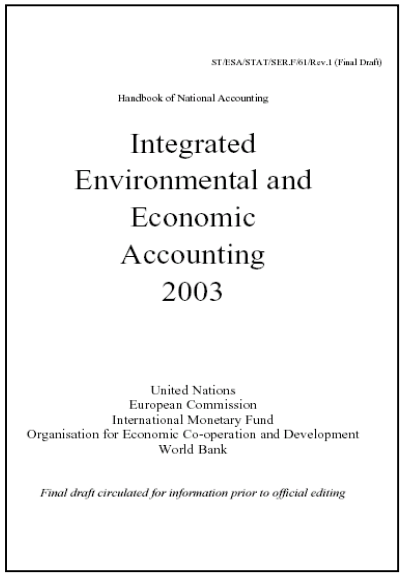
- Peskin ("accounting for environmental services")
- Ganarsjordet, Norway ("Natural Resource Accounts")
- El Serafy, WB ("User Cost")
- Repetto, WRI ("net market values")
- Hueting, NL ("distance to target")
- David Rapport & Tony Friend, Canada ("Stress-Response System")
- CICPN-France ("Les Comptes du Patrimoine Naturel")
- CICPN-Espagne (Naredo, water accounts in exergy/quantity-quality)
- Hamilton, WB, ("Genuine Savings")
- SEEA 1993
- SEEA 2003



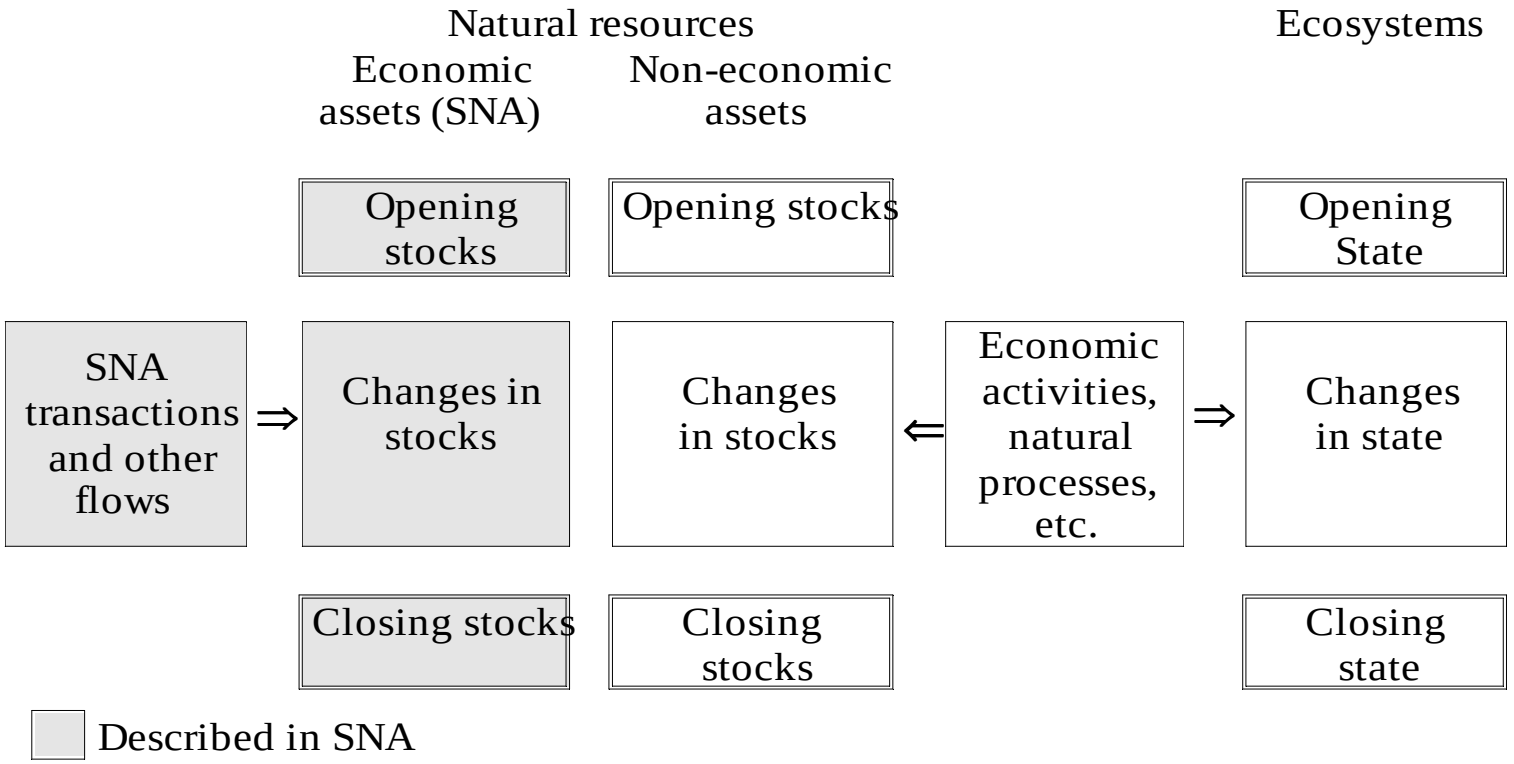
UN manual for environmental-economic accounting: **SEEA2012/13**

On par with the System of National Accounts (SNA) since February 2012





Revision of the SEEA2003 ➔ SEEA2012/13, steered by the UNCEEA



RM HASSAN - UN The System of Environmental and Economic Accounting (UN 2003) - RANESA Workshop June 12-16, 2005 Maputo

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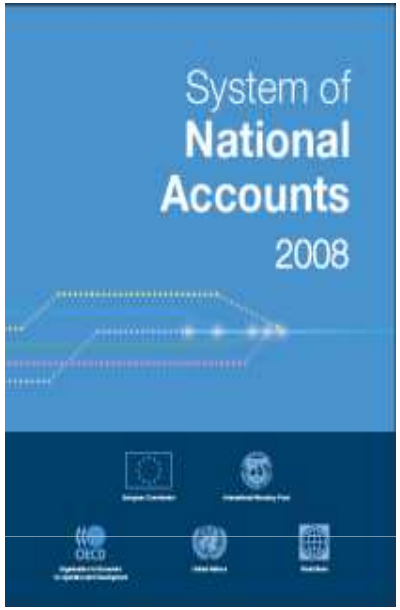

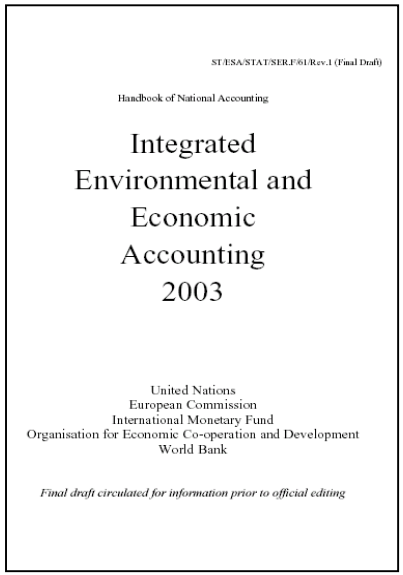

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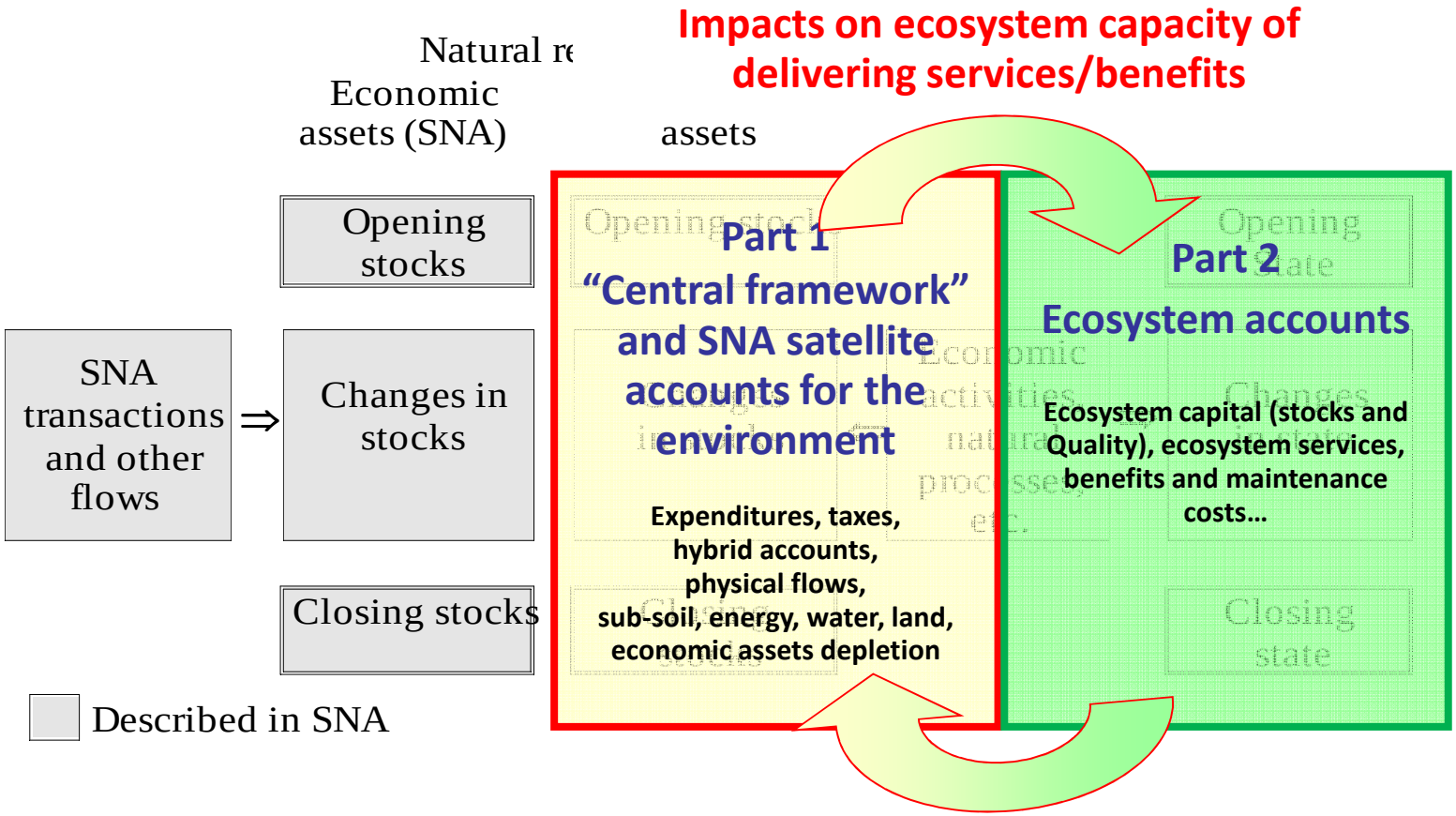

RM HASSAN - UN The System of Environmental and Economic Accounting
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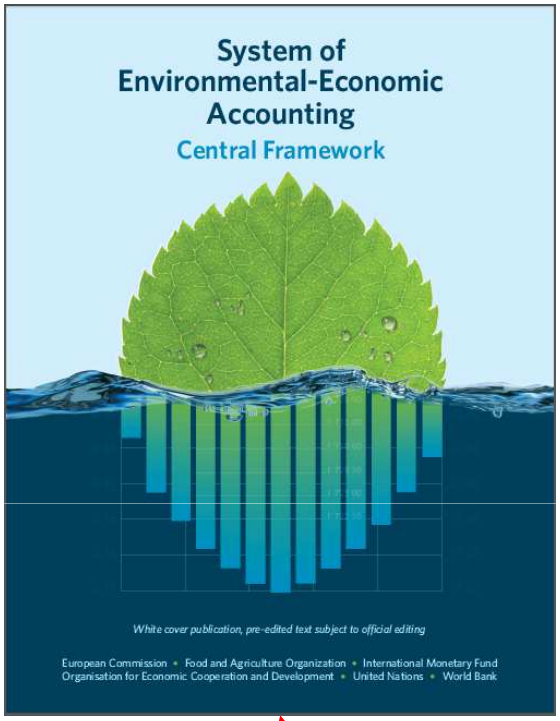
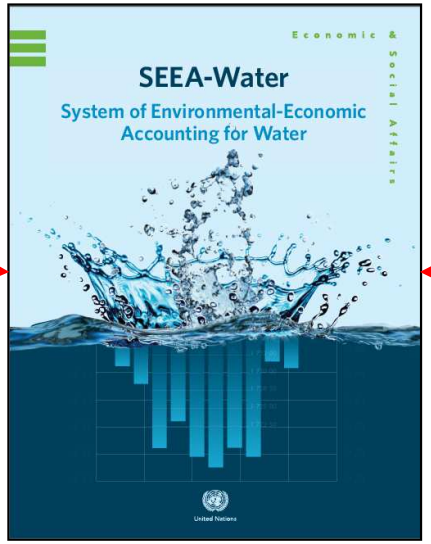
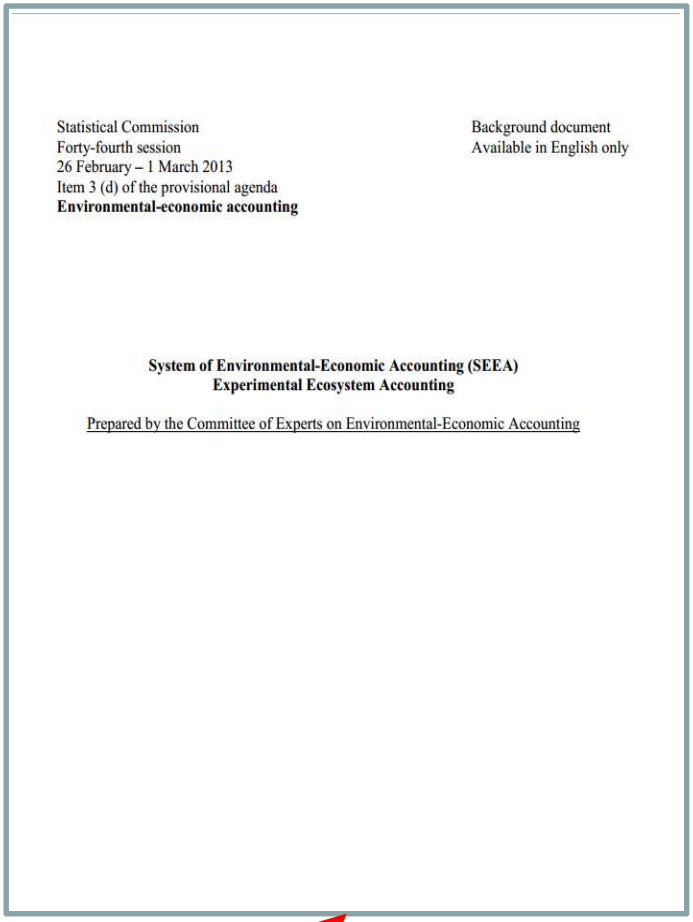
What is available in 2013



SEEA Part 1,
"Central Framework": the **statistical standard** approved by UN Statistical Commission in 2012 (assets and supply & use, SNA satellite account)



SEEA Water:
"**Interim standard**" 2007



Statistical Commission
Forty-fourth session
26 February – 1 March 2013
Item 3 (d) of the provisional agenda
Environmental-economic accounting

Background document
Available in English only

System of Environmental-Economic Accounting (SEEA)
Experimental Ecosystem Accounting

Prepared by the Committee of Experts on Environmental-Economic Accounting

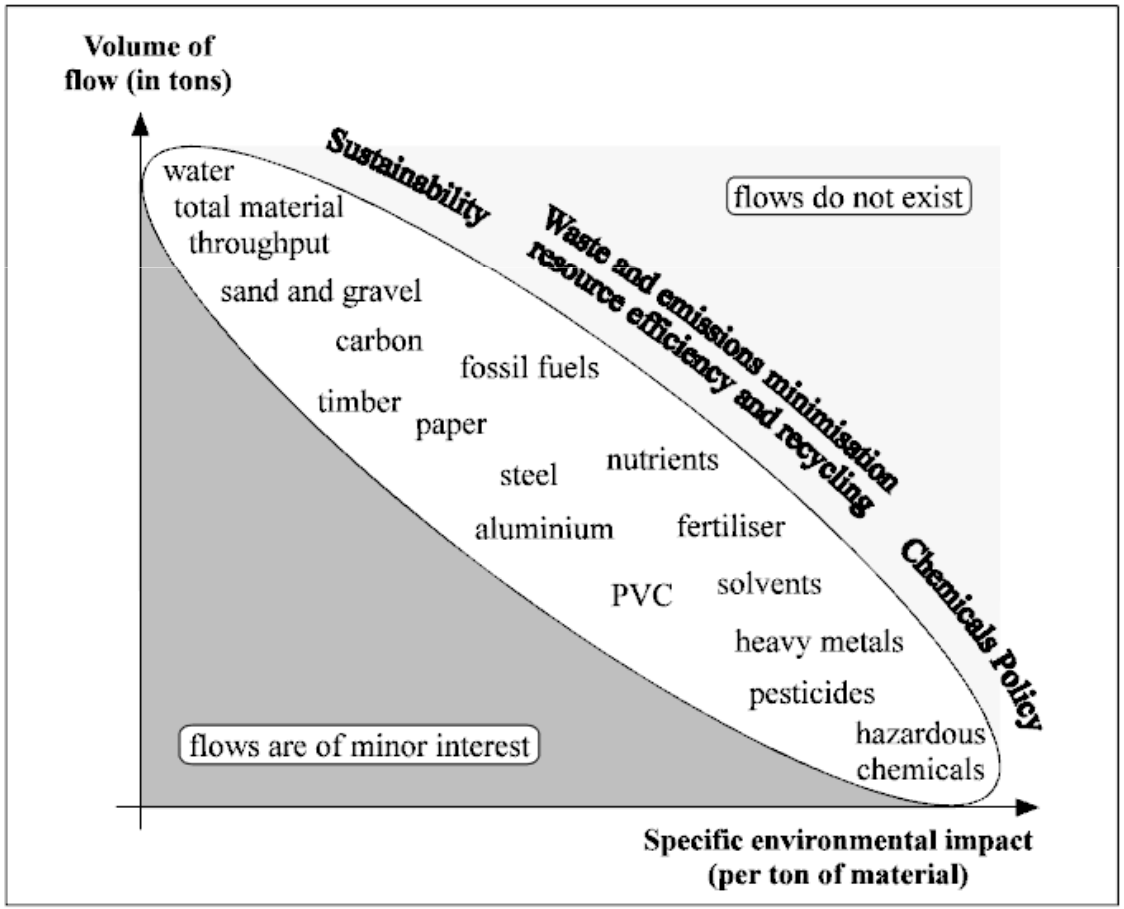
SEEA Part 2:
The **experimental ecosystem accounts** 2013

What is the System of Environmental - Economic Accounting Part1 (so-called Central Framework)?

- The System of Environmental - Economic Accounting (SEEA) Part1 “central framework” is a multi-purpose, conceptual framework that describes the interactions between the economy and the environment in terms of supply and use of resources, and the corresponding stocks and changes in stocks of environmental assets.
- It presents, in a single accounting tables format, information on water, minerals, energy, timber, fish, soil, land and ecosystems, pollution and waste, production, consumption and accumulation. However, there is no common unit for accounting.
- The accounting structure covers:
  - Physical flows accounts (PSUT), connected to the SNA’s SUT
  - Economic natural assets accounts (physical units and valuation in $ to calculate depletion)
  - Environmental protection and management expenditure accounts
  - Composite accounts, input-output analysis…

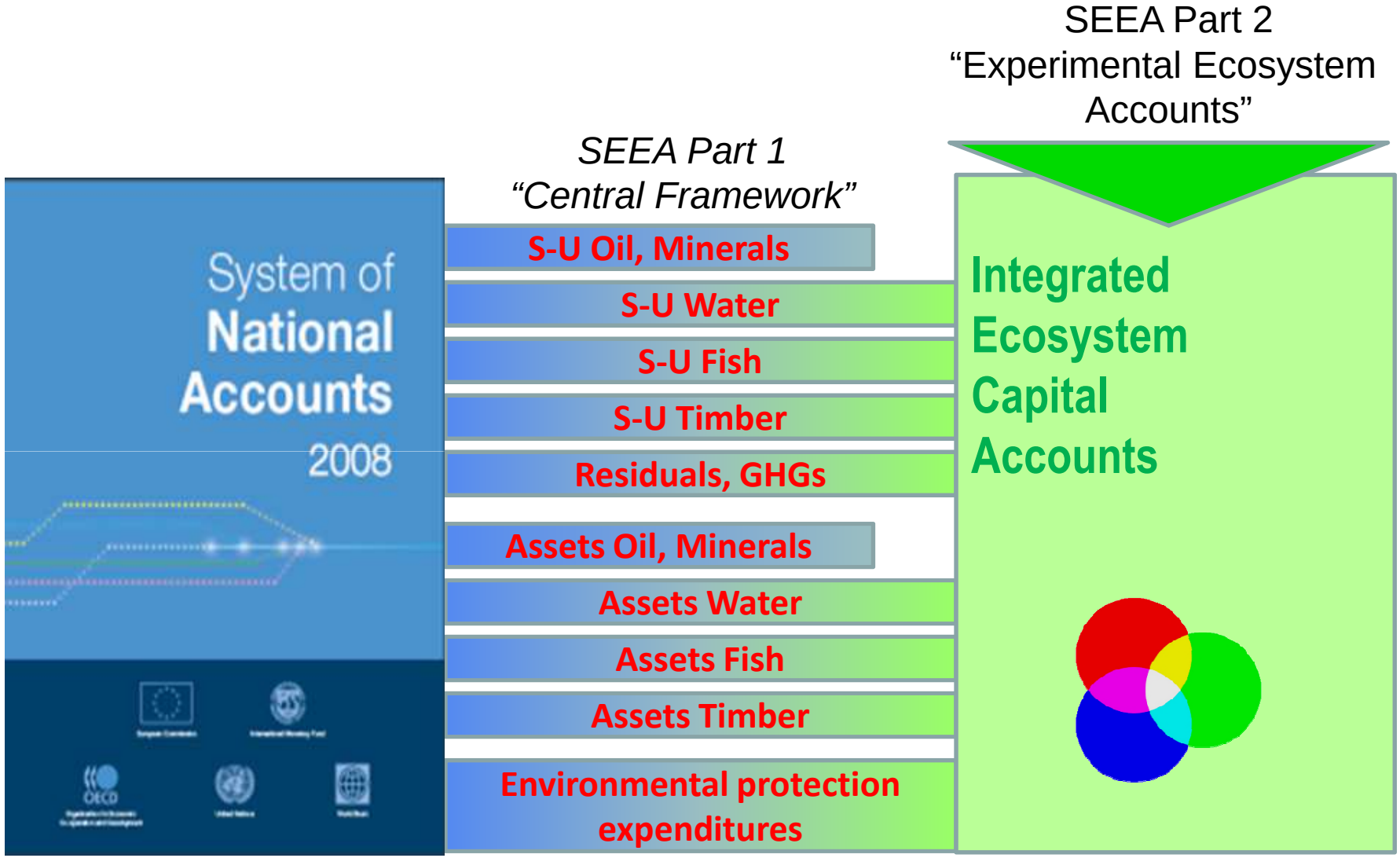
SEEA Part1: Difficulty to Aggregate Physical Supply and Use Tables

- "Of note is that, unlike monetary flows which are measured in currency units, **physical flows are generally measured in different units depending on the material**. Thus, while it is conceptually possible to compile a complete PSUT for all material flows in an economy using a single measurement unit (e.g. tonnes), it is not usual practice". (SEEA2012 , 2.47)



Source: Steurer (1996),[11] as developed with W. Radermacher (StBA) in 1995

SEEA Part1 is a satellite account of the SNA



Core Accounts and Functional Analysis

- SNA Core Accounts: quadruple entry accounts; strict rules to balance the accounting system; no double-counting allowed; based (mostly) on observed statistics; backward looking; **internal adjustments by subtraction are issues** (e.g. calculate a "Green GDP"), additions are possible should not lead to double-counting or/and to prices inconsistency…

- ➔ Satellite Accounts introduced in the SNA 1993: functional analysis of social domains (education, health, social protection, R&D, environment…) or sectors (energy, agriculture…); double-counting between domains is possible; overall price consistency is limited to elements recorded into the Core Accounts, flexibility beyond that; possible to introduce ad hoc valuation rules; **external adjustments** of GDP: no subtractions but comparisons (ratios Physical/Core_$ or Satellite_$/Core_$…); additions possible only if prices are consistent…

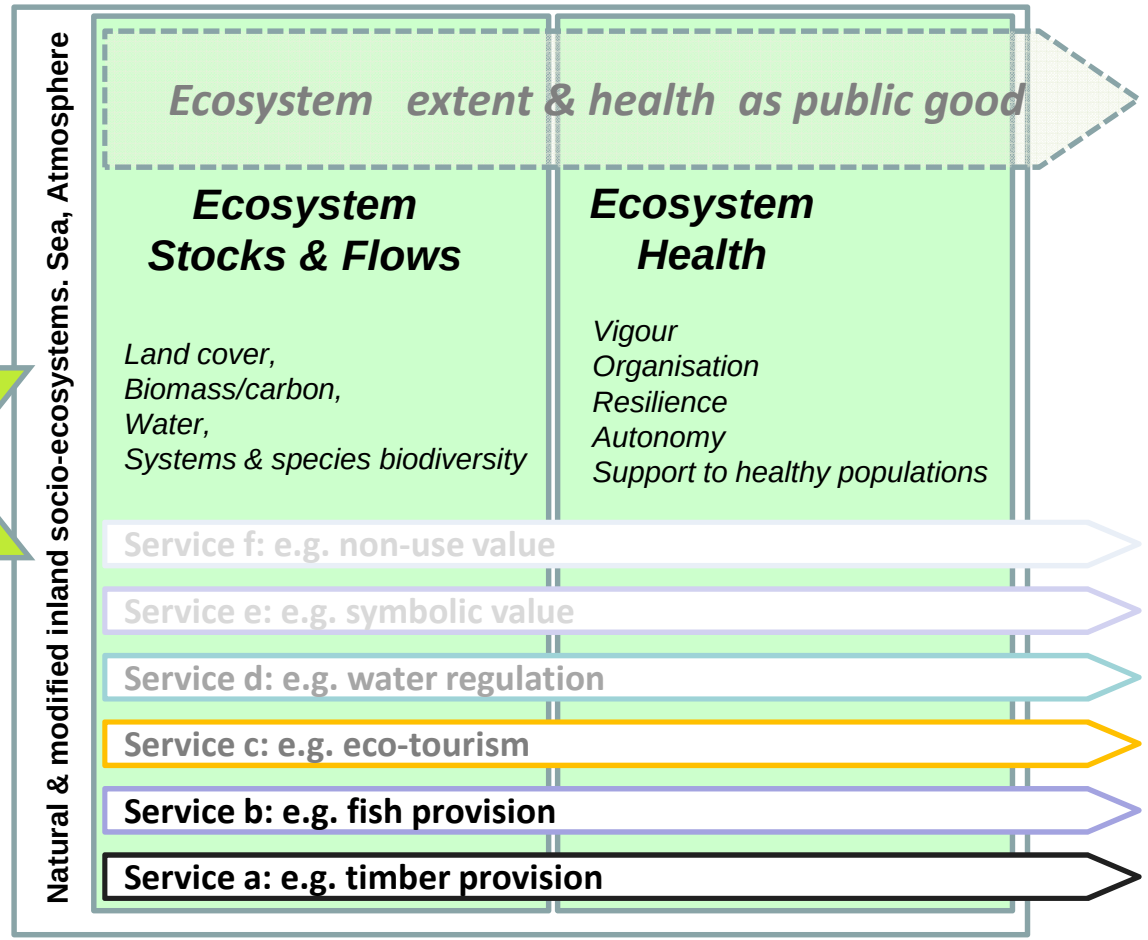
- Core Ecosystem Accounts are compiled in physical units…

- **Valuation of ES and Assets is functional analysis**

Physical vs. Monetary accounts

Physical accounts, *assets* → Monetary accounts

Maintenance/restoration costs, Collective Preferences, Consumption of Ecosystem Capital, Final Consumption at Full Price Ecological Debts (2)



Ecological Taxes or/and Tradable Offset Certificates

Ecological Balance Sheet, in physical units

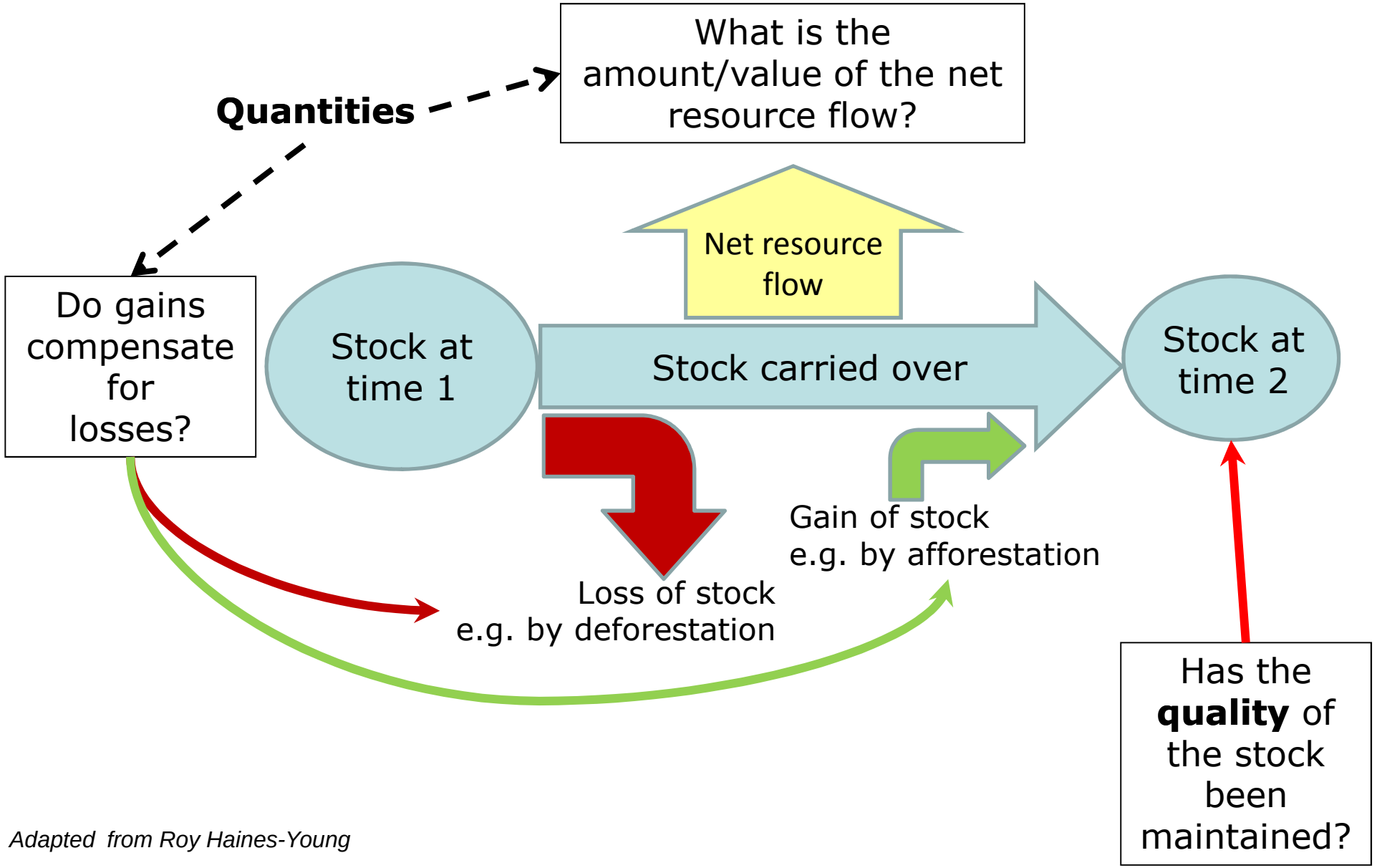
Ecosystem Capability, Resource use, Degradation / Enhancement, Ecological Debts / Credits (1)

Service f $ value
Service e $ value
Service d $ value
Service c $ value
Service b $ value
Service a $ value

Physical accounts, *services* → Monetary accounts

Ecosystem services values, Individual Preferences, Market and shadow prices, Costs-Benefits analysis

Ecosystem Capital Account attempt to respond to basic questions when accounting…



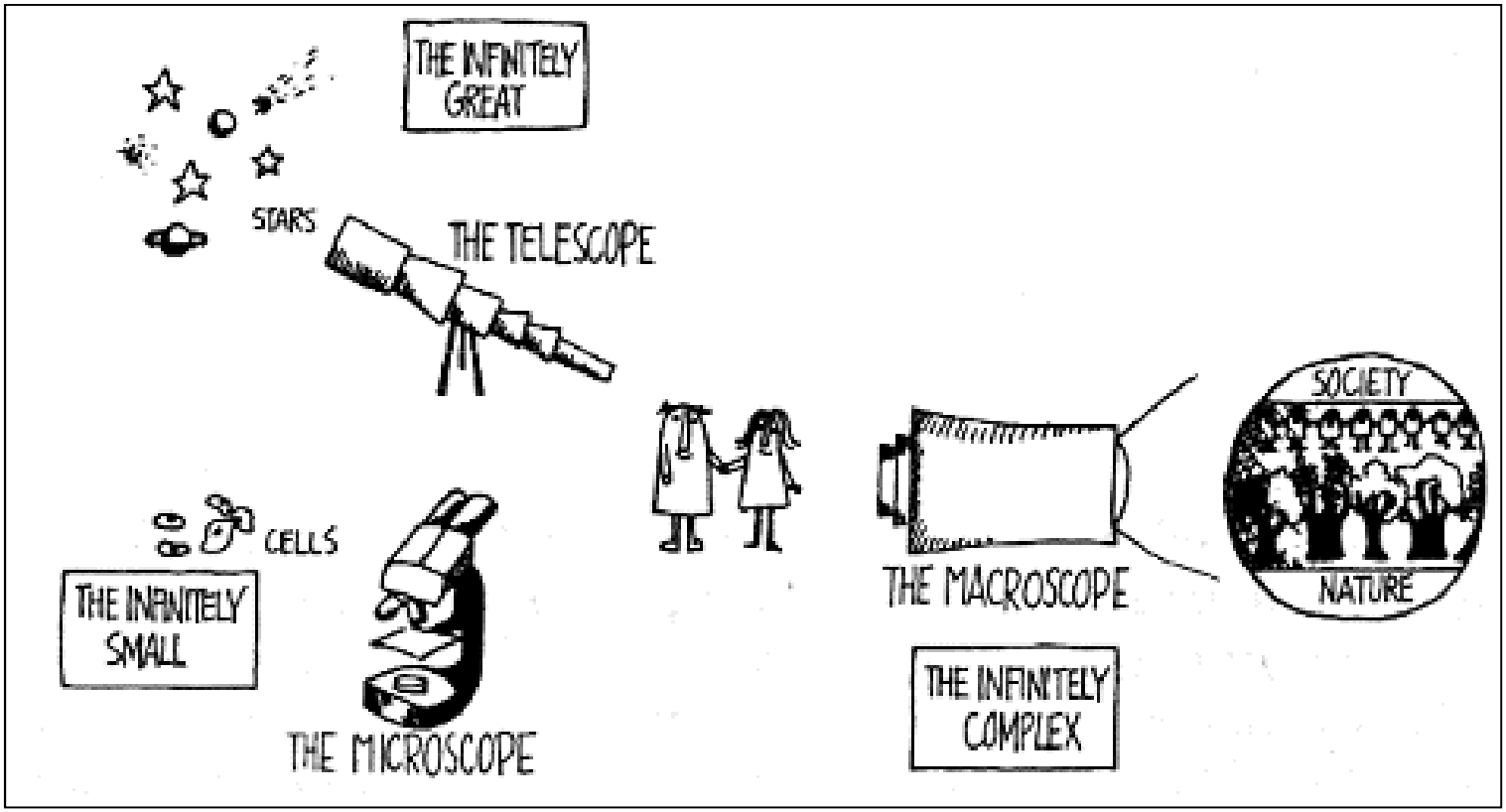
Adapted from Roy Haines-Young

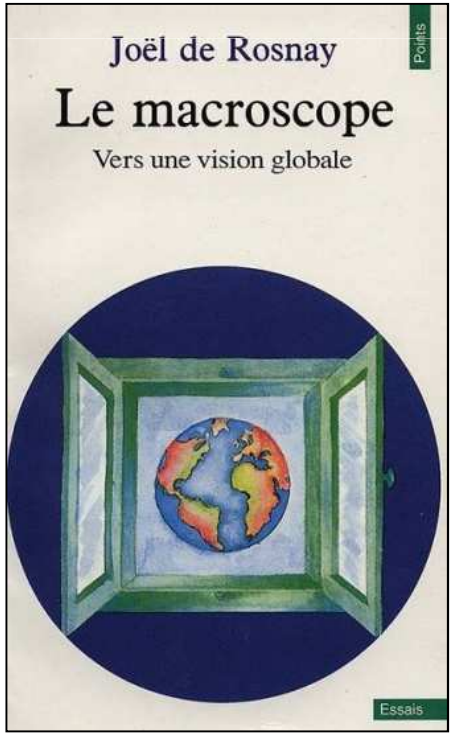
Ecosystem capital accounts and main policy applications

Accounts in physical units and hybrid	***Resource use efficiency ("Green Growth")***
	Social demand for ecosystem services
	Ecological liability, physical Ecological Balance Sheet
	Ecological sustainability of productions depending from ecosystem services (agriculture, forestry, fishery, tourism…)
Accounts in monetary units	***Environment protection policies (public and private expenditures)***
	Valuation of ecosystem services embedded into products and assets market values
	Valuation of unpriced ecosystem services (e.g. ABS…)
	Assessment of ecosystem capital depreciation ($)
	Macro-economy: Adjustment of conventional aggregates
	Ecological liability, monetary Ecological Balance Sheet

The Ecological Balance Sheet: an integrated framework

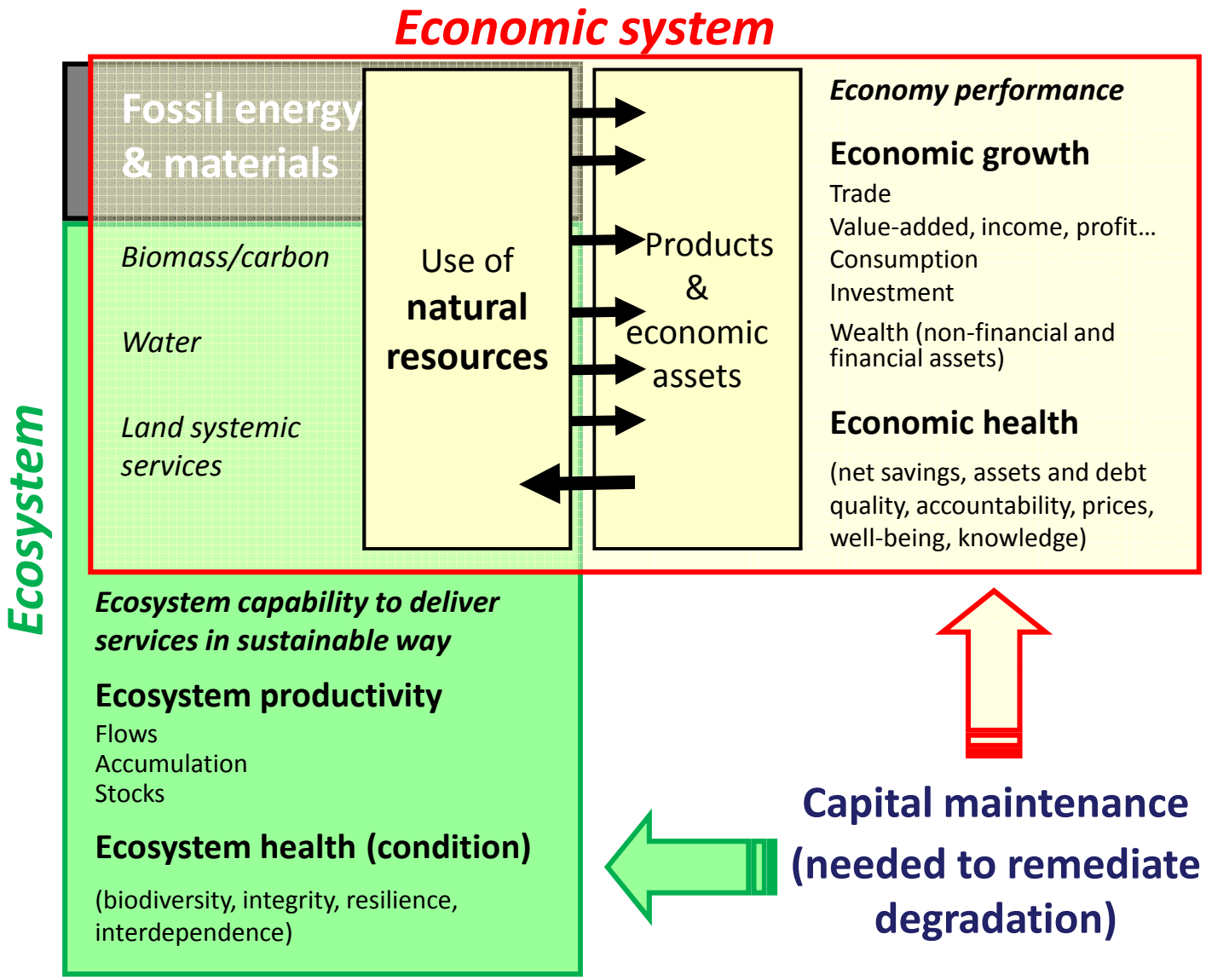
QUESTION: Is the Ecological Balance Sheet similar to the Macroscope?





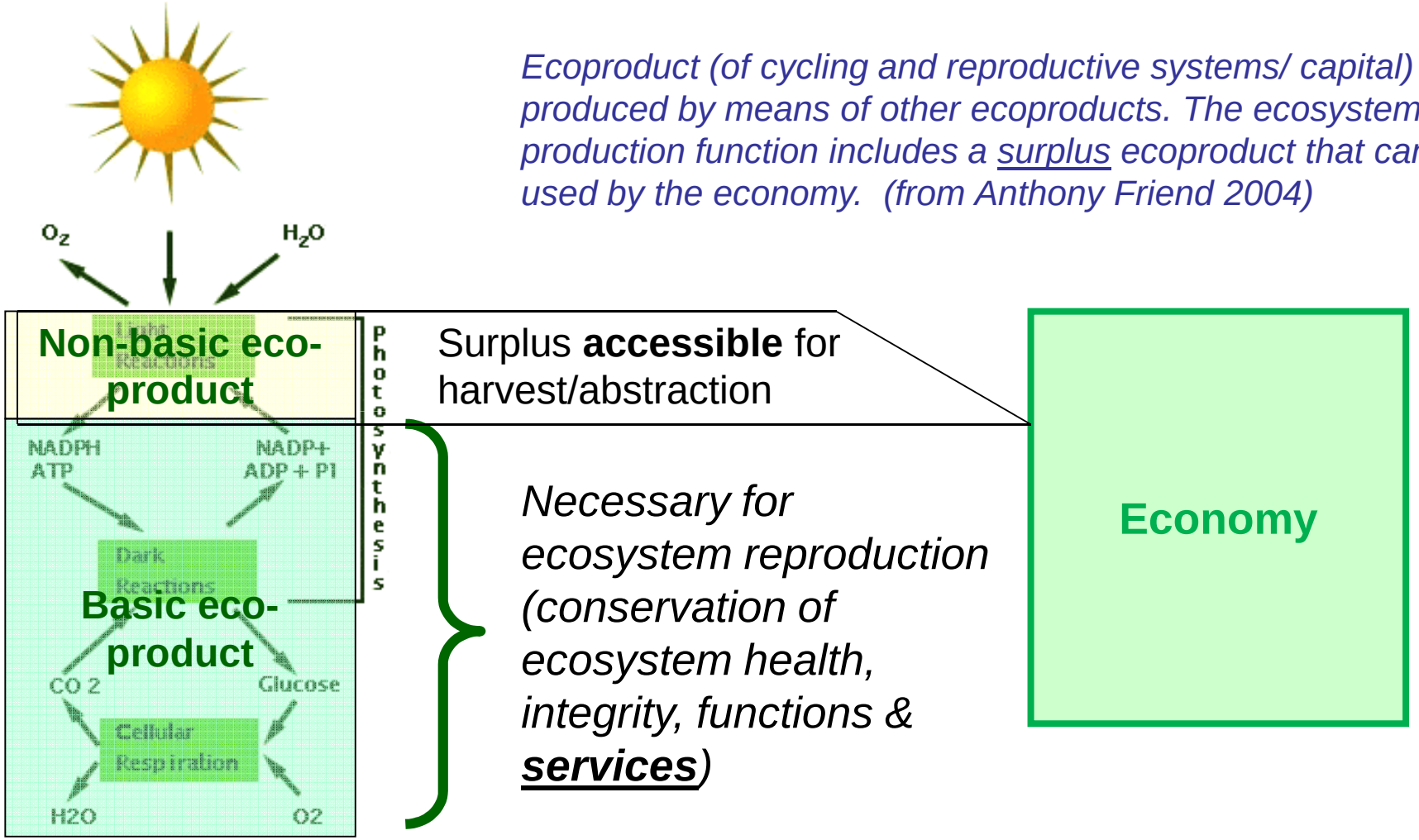
The narrative behind Ecosystem Capital Accounts:

1 - Accounting for the performance(s) of 2 co-evolving systems: resources, productivity and health



The narrative behind Ecosystem Capital Accounts:

2 - Only a **surplus** is **accessible** for human use



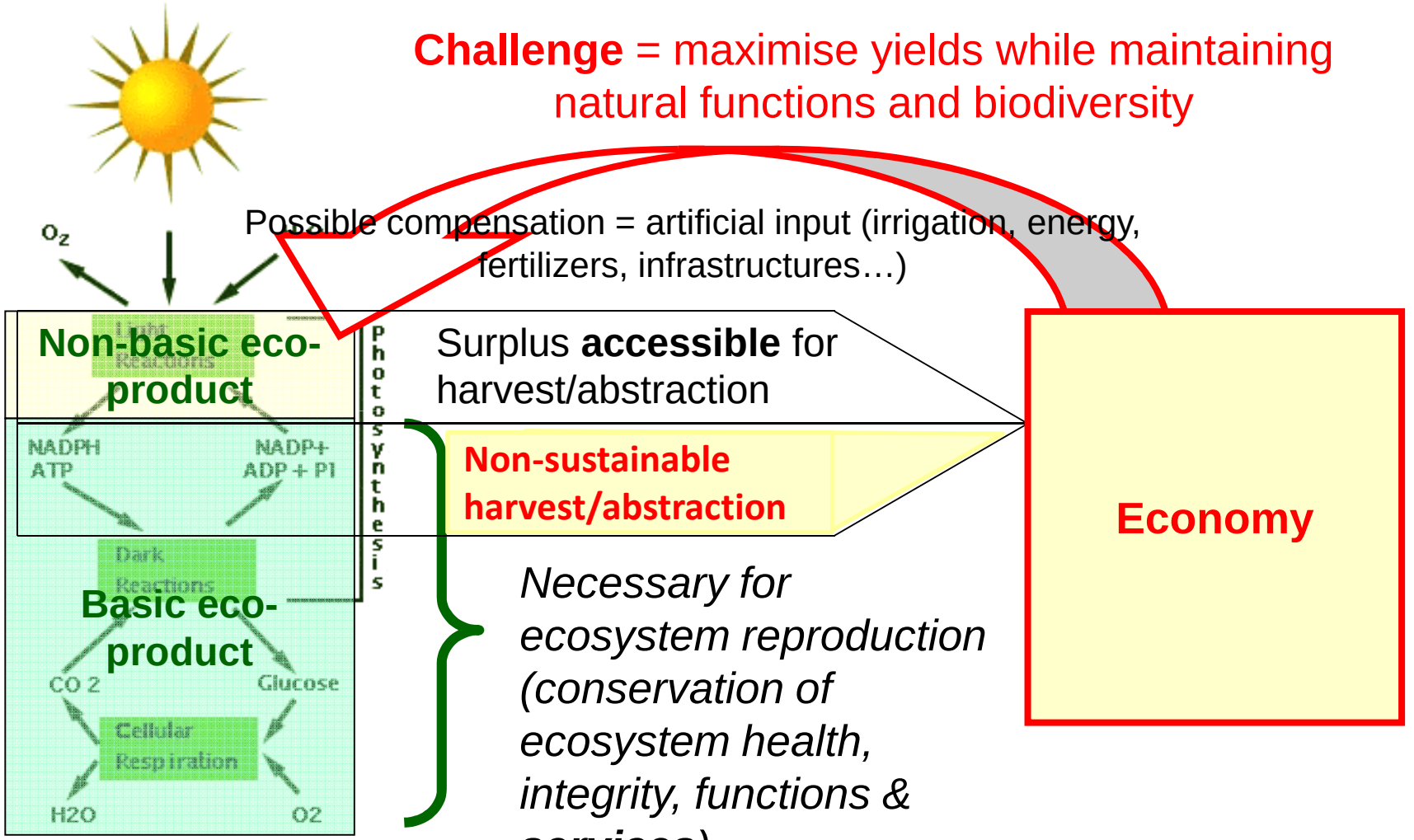
Ecoproduct (of cycling and reproductive systems/ capital) are produced by means of other ecoproducts. The ecosystem production function includes a surplus ecoproduct that can be used by the economy. (from Anthony Friend 2004)

*Necessary for ecosystem reproduction (conservation of ecosystem health, integrity, functions & **services**)*

Sources: Kling/U Michigan_2005 & Friend/ISEE_2004

The narrative behind Ecosystem Capital Accounts:

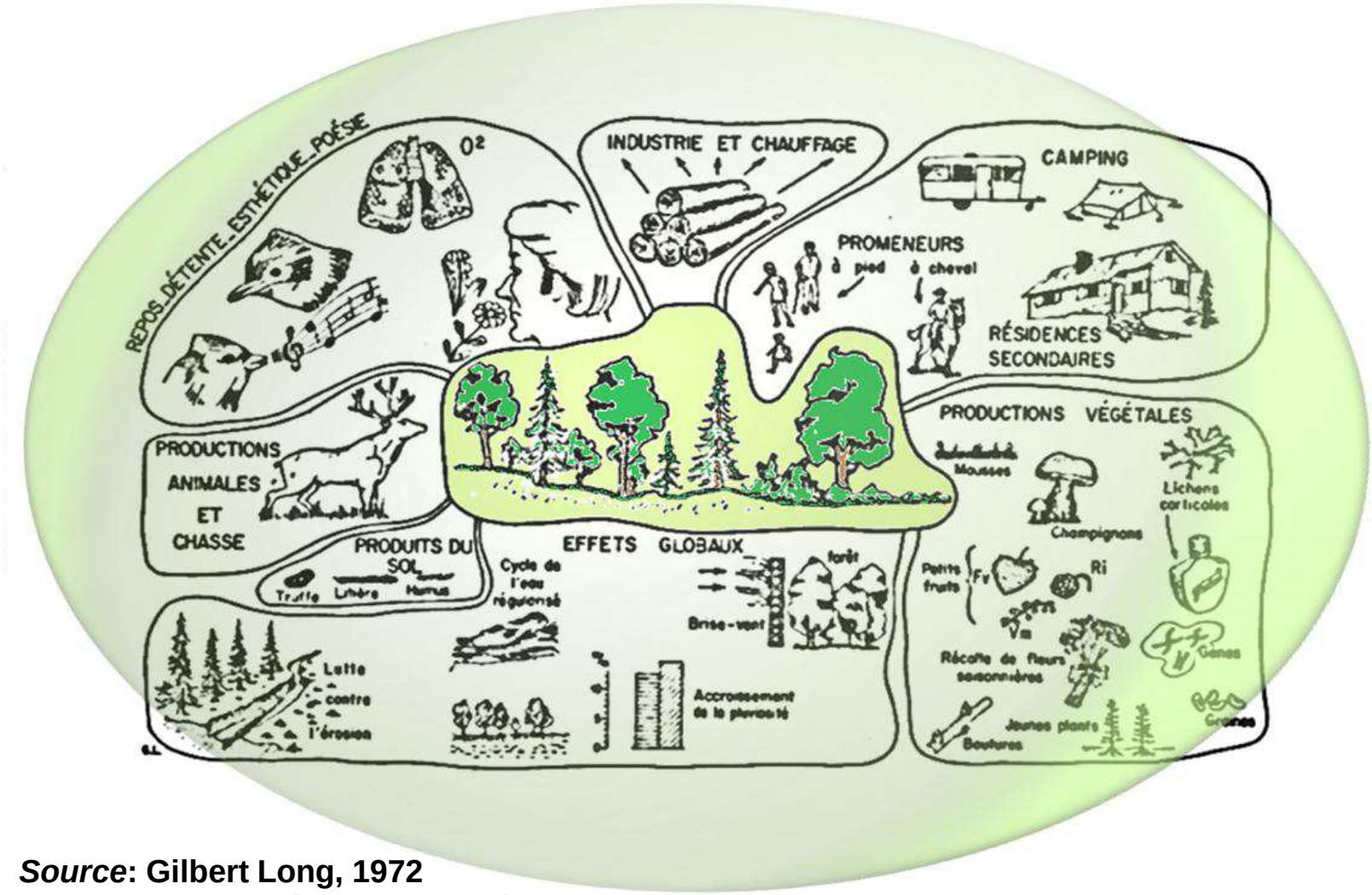
3 - Only a **surplus** is **accessible** for human use



Sources: Kling/U Michigan_2005 & Friend/ISEE_2004

The narrative behind Ecosystem Capital Accounts:

3 - Ecosystems deliver altogether **multiple services**



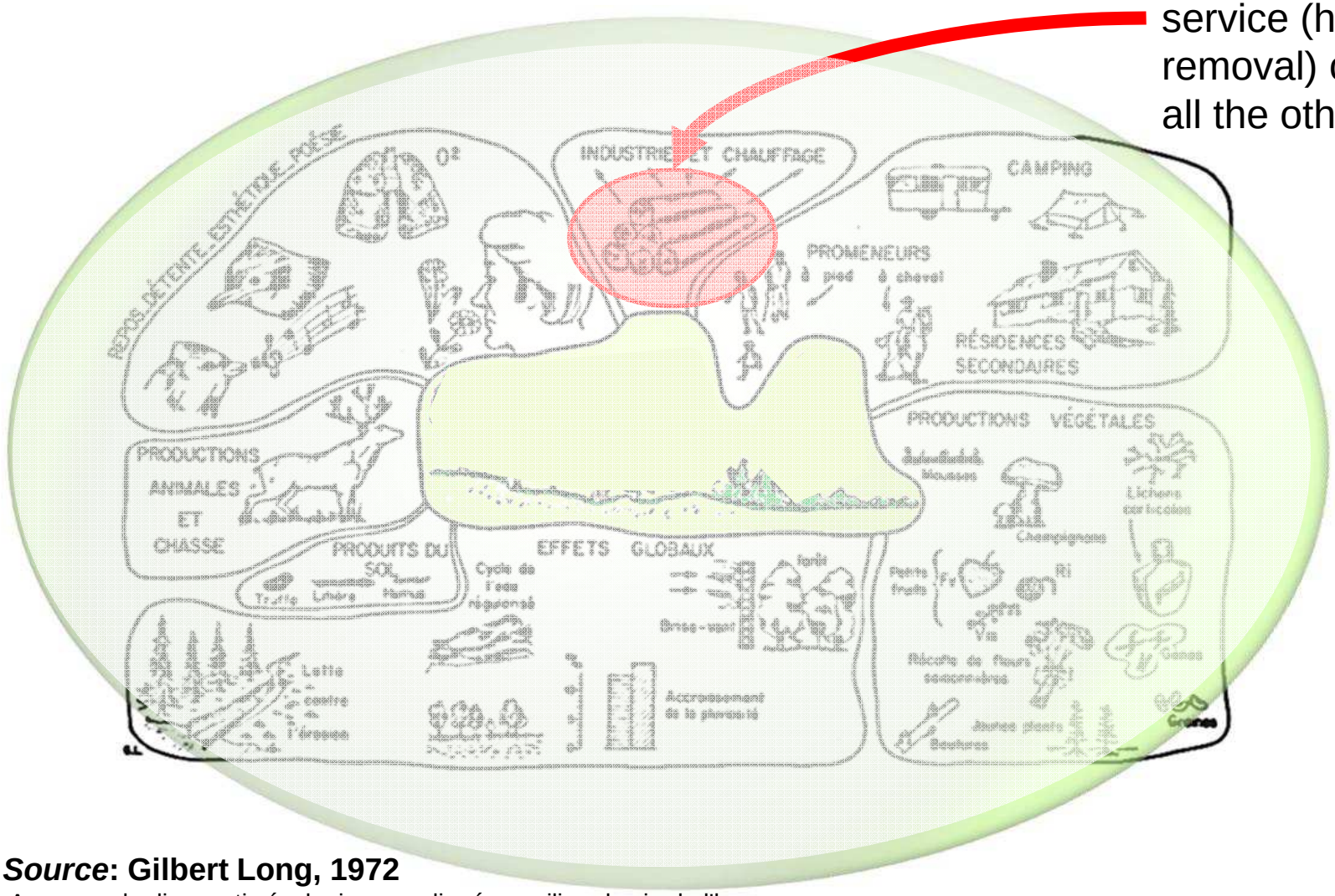
***Source*: Gilbert Long, 1972**

A propos du diagnostic écologique appliqué au milieu de vie de l'homme.
Options Méditerranéennes, 13 , CHIEAM, Montpellier, Juin 1972

The narrative behind Ecosystem Capital Accounts:

3 - Ecosystems deliver altogether **multiple services**

NOTE: Excessive extraction of 1 service (here wood removal) can ruin all the others



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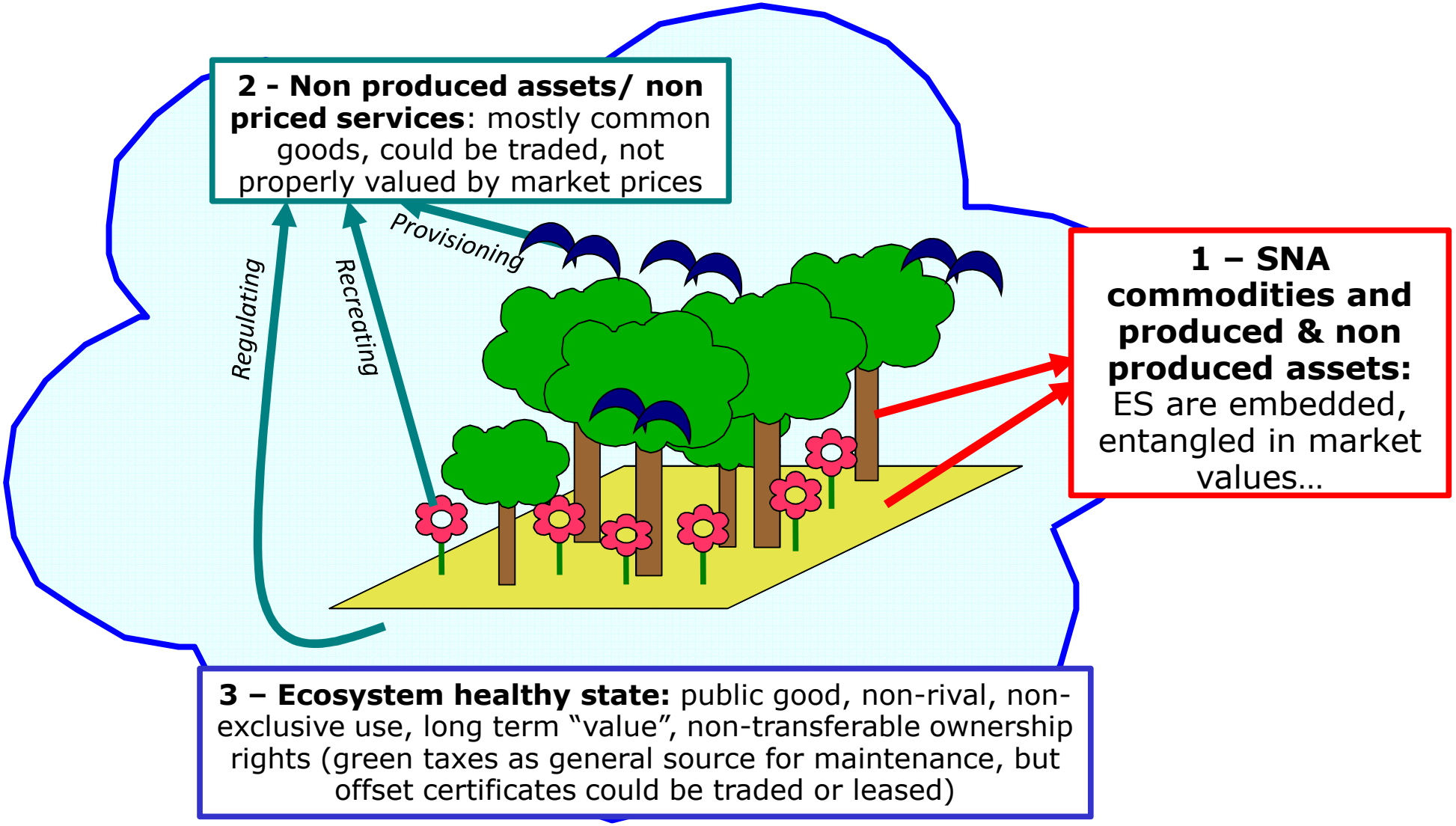
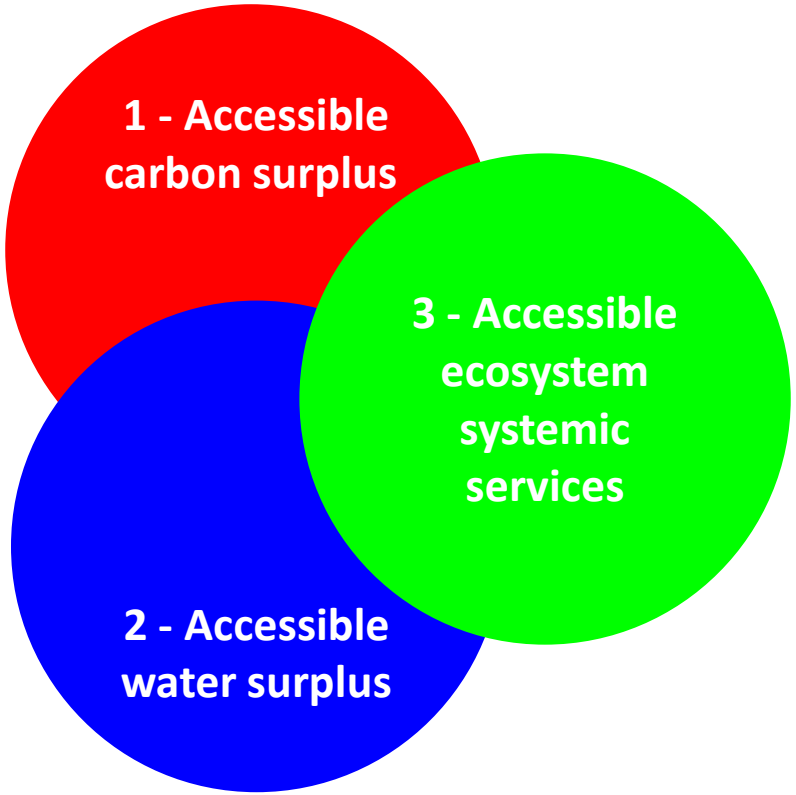
The narrative behind Ecosystem Capital Accounts:

4 - Ecosystems, economic assets, services and values: 3 “values” in 1



The narrative behind Ecosystem Capital Accounts:

5 – A simplified integrated model: the ecosystem capital supplies altogether 3 broad types of services between which there is little possible compensation or tradeoff: **biomass/carbon** AND **freshwater** AND **systemic services**. Ecosystem capital potential (& degradation) can be measured by combining measurements of these 3 broad services (accessible resources).



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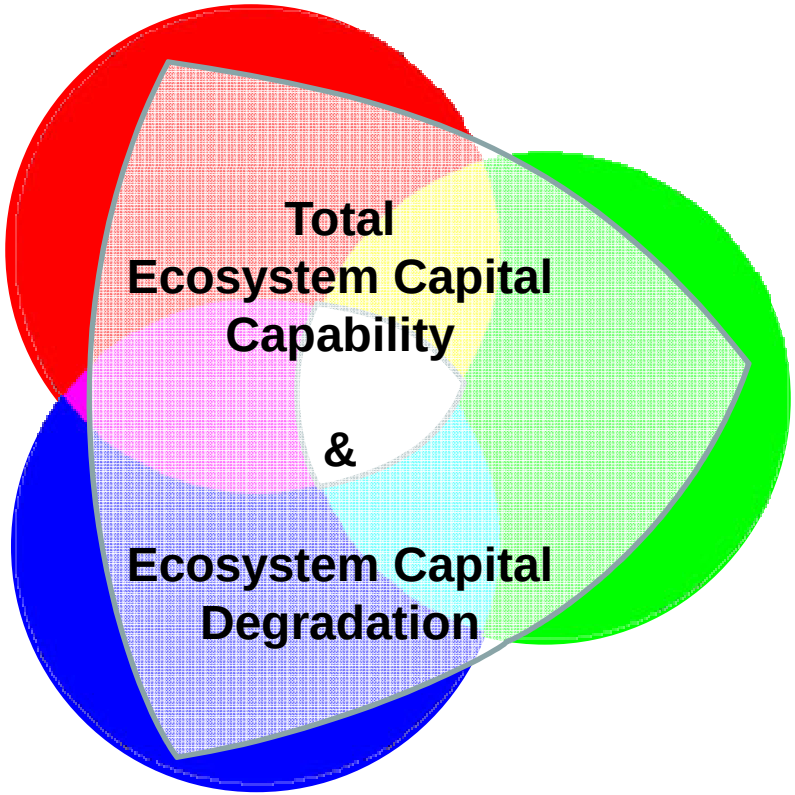


Measurement with a new physical currency: **ECU** for
Ecosystem Capability Unit

Moving from Quantities to Values: Economic value vs. Ecological value

- Economic value = quantity x price

Financial & national accounts: values are established by the market; prices are decided by the transactors, they relate to production costs, to the capacity for the seller to make profit, to the quality for the buyer, to its capacity to negotiate discounts…

- Ecological value = quantity x "price"

Ecosystem capital accounts: values need to be calculated, knowing quantity and defining an overall "quality" index equivalent to market price

➔ ***General equivalency, measurement of stores of various ecosystem capabilities and changes (degradation, improvement)***

➔ ***Conventional but transparent and verifiable measurement to be used to record ecological credits (ecosystem enhancement) and debts (degradation)***

ECU: a composite currency to measure ecosystem capability, degradation and improvement, ecological debts and credits…

In physical accounts, measurements are made in basic units (tons, joules, m^3 or ha) which cannot be aggregated. These measurements are converted to a special composite currency named ECU for 'Ecosystem Capability Unit'.

The price of one physical unit (e.g. 1 ton of biomass) in ECU expresses at the same time the intensity of use of the resource in terms of maximum sustainable yield and the direct and indirect impacts on ecosystem condition (e.g. contamination or biodiversity loss). Loss of ecosystem capability resulting from human activity is a measurement of **ecological debt** (in ECU).

François 1st (1515-1547), Ecu d'or au soleil du Dauphiné, Source : Münzen & Medaillen GmbH (DE)

1 ECU = 1 unit of accessible ecosystem resource

There is no exchange rate between ECU and $ or €.

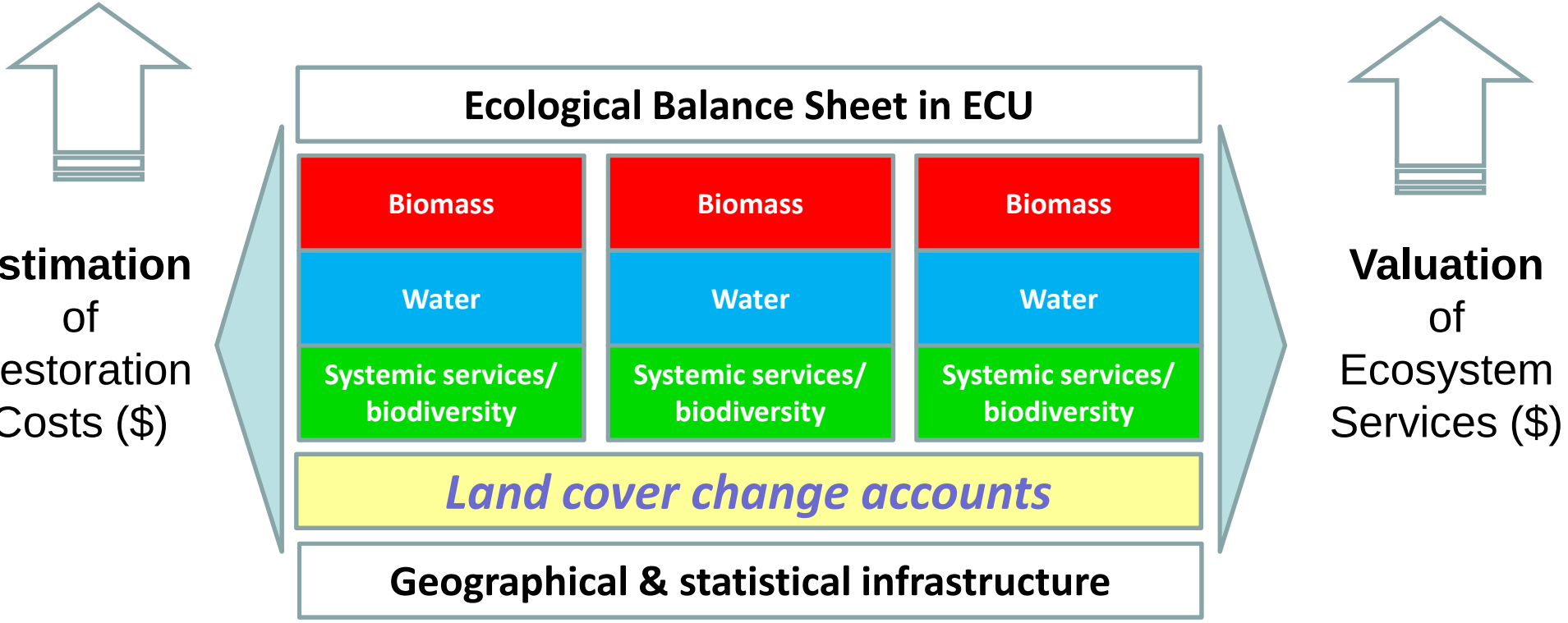
Examples of equivalent-units to measure physical ecosystem flows/stocks

- **Tonnes** (Ayres): Material Flows Accounts (MFA); all tonnes are equivalent…
- **Tonne of Oil Equivalent (TOE)** (International Energy Agency, OECD…): energy released by burning one tonne of crude oil
- **Livestock Unit (LU)** (FAO, …): all grazing livestock animals measured in "adult cow"…
- **Environmentally weighted tonnes**: EWMF, tonnes adjusted for potential environmental impacts (toxicity, life cycle…)
- **Global Hectares** (Wackernagel): Ecological Footprint Accounts, "biocapacity" of 1 hectare
- **EMERGY** (Odum): embedded renewable energy as universal equivalent
- **Ecointegrador** (Naredo/Valero): total exergy (energy available for uses) of water systems integrating quantity and quality, with reference to environmental targets
- **Econd** (Cosier, WGCS/Australia): ecosystem condition unit (a currency) to measure ecosystem biodiversity comparing historical and present condition (extent and health)
- **ECU** (Weber, EEA): ecosystem capability (or potential) equivalent-unit (a currency) integrating quantity (productivity) and quality (ecosystem health)

Core physical ecosystem accounts and monetary accounts

Consumption of Ecosystem Capital,
Adjustment of Final Demand (Full Cost)
Ecological Balance Sheet in $

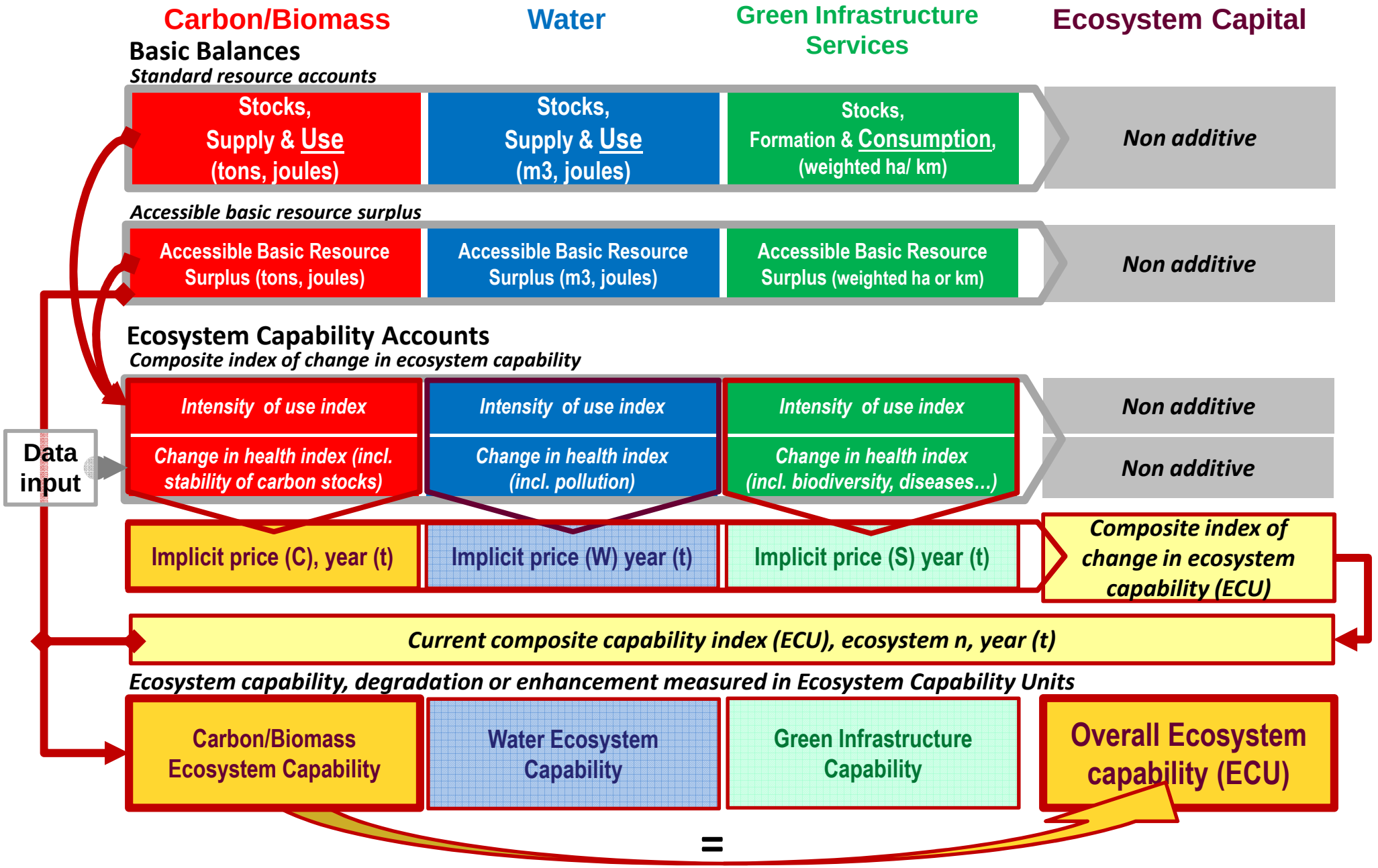
Economic benefits of projects,
policies and plans



Estimation of Restoration Costs ($)

Valuation of Ecosystem Services ($)

Calculation of Ecosystem Capital Capability in ECU



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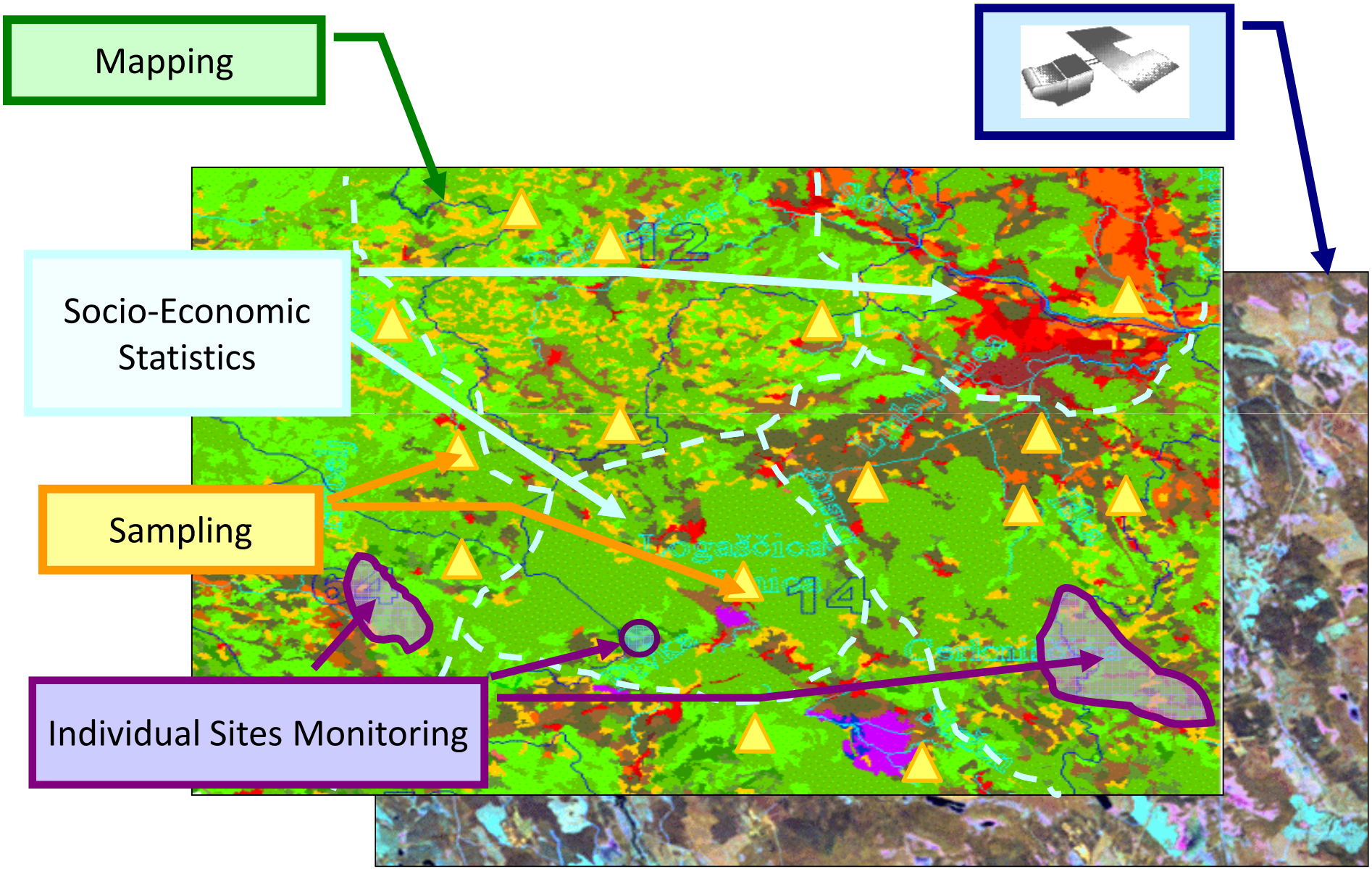
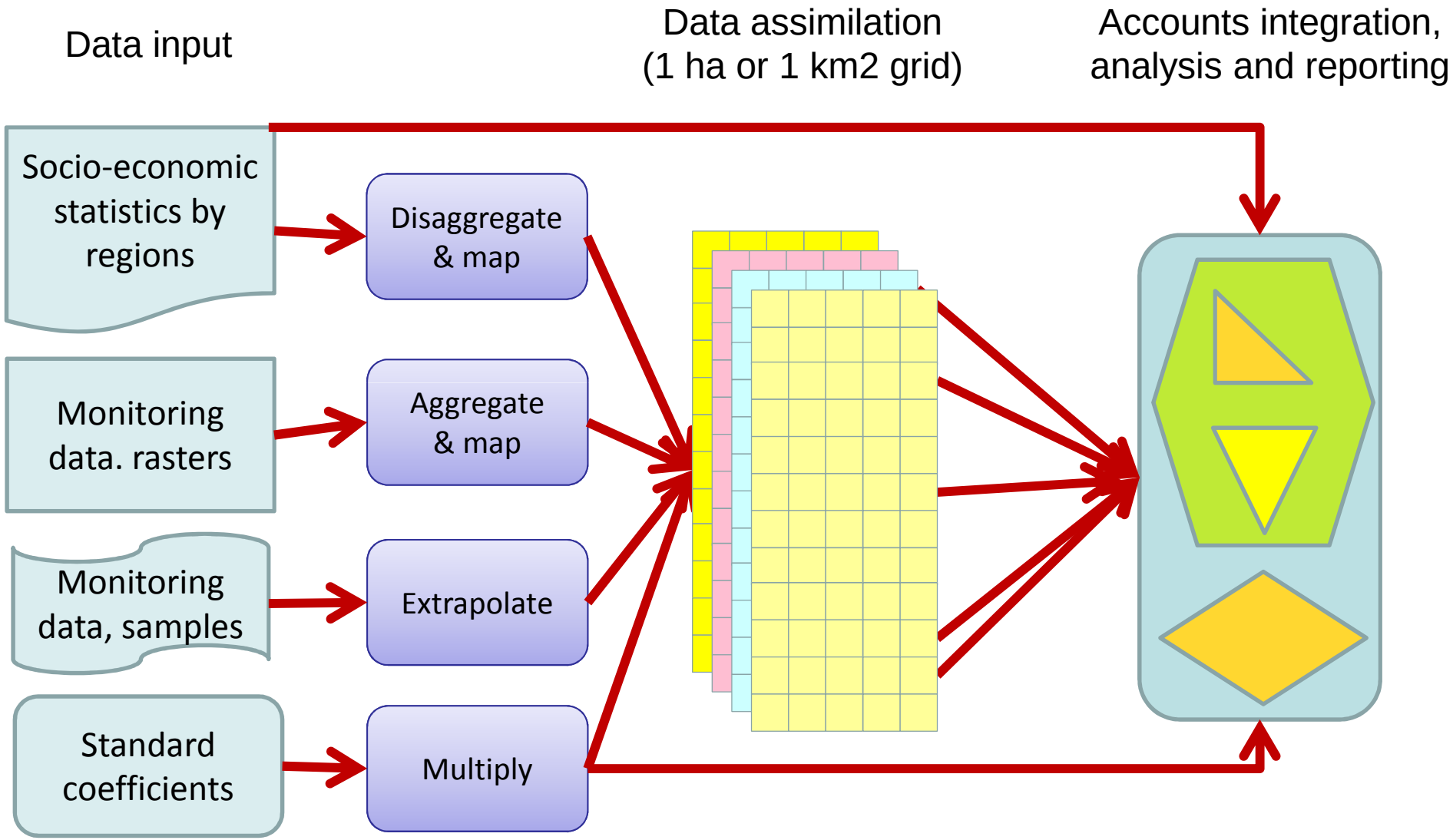
Spatial Integration of Environmental & Socio-Economic Data



Main data flows to compile ecosystem capital accounts



From ecosystem physical degradation to capital consumption, ecological debts and sustainable benefits

Consumption of ecosystem capital (unpaid costs) & ecological debts (in $)

Economic statistics & national accounts

Ecological sustainability of **Value Added supported by ecosystem services**

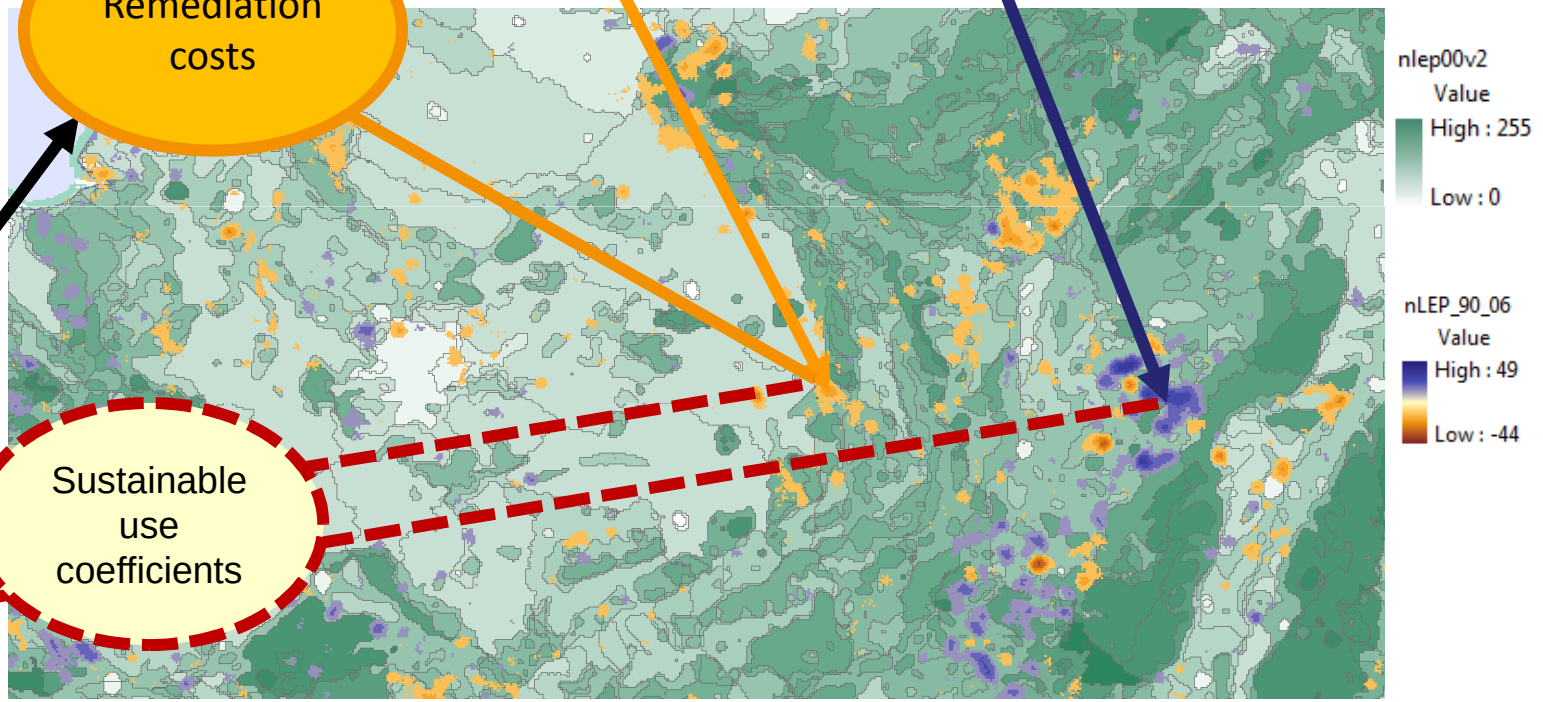
Remediation costs

Sustainable use coefficients

Degradation

Enhancement

Balance sheet of ecological debts & credits (ECU)



Landscape Ecological Potential change 1990-2006, by ecosystem landscape units

(J-L Weber and E. Ivanov, 2011)

Next:

➔ Environmental accounts in Burkina Faso : the experience of the pilot project

➔ Methodology of basic ecosystem capital accounts

1. The land cover account (from the Burkina Faso BDOT experience)
2. The biomass/carbon account

3. The water account
4. The systems and species biodiversity account
5. Implementation issues

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