TOWARDS ECOLOGICAL STEWARDSHIP BASED ON SPATIALLY EXPLICIT ECOSYSTEM ACCOUNTS

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Why Accounting for Ecosystems? To Measure Capital Degradation (or Recovery)

**Ecosystem degradation impacts**
- Natural resource loss
- Biodiversity loss
- Desertification
- Water disturbance, droughts, floods
- Climate change and adaptation issues
- Exposure to natural risks
- Un-sustainability of ecosystem services...

**and associated socio-economic issues**
- Little economy’s liability to its impacts on ecosystems
  = No ecosystem capital depreciation
  = Unpaid monetary costs (Avoidance, Restoration, Offset…)
  = Ecological debts and related financial risks
  = Food (in)security
  = Health issues (clean water, clean urban air…)
  = Un-sustainable economic growth

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**Ecosystem capital degradation**
= Loss of ecosystem capability to supply services and sustain life on Earth
= Loss of intrinsic ecological value

The System of Environmental-Economic Accounts “Central Framework” (SEEA-CF) adopted by the UN Statistical Commission in 2012 as an international statistical standard on par with the System of National Accounts (SNA 2008) has been supplemented in 2013 by a volume on “Experimental Ecosystem Accounting” (SEEA-EEA). While the SEEA-CF is recommended for implementation, the SEEA-EEA which is a conceptual framework is now tested in various projects.

The CBD TS77 Ecosystem Natural Capital – Quick Start package (ENCA-QSP) is a contribution to the implementation of the SEEA.
ENCA-QSP: A Quick Start Package to support the implementation of the UN SEEA-Experimental Ecosystem Accounts

- A response to the requirement of the CBD Aichi Target 2 call for incorporating, as appropriate and by 2020 at the latest, biodiversity values into national accounting.
- A Quick Start Package
- A technical accounting framework for measuring ecosystem sustainable capacity, resilience and economic sectors’ accountability to the ecosystem.
- It includes a full set of tables and guidance for compilation.
- Supported by a tutorial for technical training of experts (Kangaré)

http://www.ecosystemaccounting.net/

Which Accounting Metrics? ENCA Measures Ecosystems Intrinsic Value

Ecosystem

Public Good: Ecosystem Functions (regulation of climate and water, healthy air, biodiversity... and sustainability of services)

Appropriated Resource: Economic Natural Assets

Intrinsic Value

Metrics = Ecosystem Capability Units

Utilitarian Value

Metrics = Money

How to Account for Degradation? In Ecosystem Capability Units (ECU)

- **SEEA-EEA**: services and assets are integrated in monetary units. It measures utilitarian value.
- **ENCA-QSP**: integration of ecosystem capital with a composite index called **Ecosystem Capability Unit (ECU)**. ECU is a currency to measure intrinsic value.

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**Total Ecosystem Capability**

Degradation or Enhancement

(measured in ECU currency)

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<td>Water Balance (m³)</td>
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<td>Ecosystem Infrastructure / Biodiversity Balance (weighted ha or km)</td>
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**Composite Index**

ECU
Overview of CBD-ENCA-QSP

Unpaid costs (in $)
of restoration and offset
[today not recorded in the SNA and companies’ accounts]

Ecosystem services values (in $)
(e.g. SEEA-EEA, TEEB, models...)

Ecological Balance-Sheet of Sectors and Companies (in ECU):
- **Ecosystem Physical Assets, Receivables and Debts**
- **Total Ecosystem Capability, Degradation or Enhancement**
  (in Ecosystem Capability Units, ECU)

**Index**
- Resilience / Health Index
- Sustainable Use Index
- Carbone Balance (tonnes, joules...)
- Water Balance (m³)
- Ecosystem Infrastructure/Biodiversity Balance (weighted ha or km)

Land cover account (ha) + Hydrographical network

Ecosystem Natural Capital Accounts are Deep-rooted in Geospatial information

**Economy**

**Total Ecosystem Capital Capability in ECU, Stocks and Change**

- **Stocks**
- **Enhancement**
- **Degradation**
- **Balance sheet in ECU of physical assets, ecological debts and receivables**

**Unpaid costs:**
Ecosystem Capital Consumption (National accounts) or Depreciation (Financial Accounts)

Final Demand at Full Price

Ecological sustainability of Value Added supported by ecosystem services

**Sustainability coefficients**

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

The ENCA-QSP Data Model: Assimilation & Integration of Statistics and Geo-Data

Data input
- Socio-economic data and statistics (by regions)
- Satellite images
- Generalised monitoring data
- Data from monitoring stations, samples
- Hotspots
- Statistical & geographical reference datasets

Data QA/QC, analysis & processing
- Disaggregate & map
- Classify, aggregate & map
- Analyse & process
- Extrapolate
- Overlay & integrate
- Extract, cross-check codification

Data assimilation (e.g. within 1 ha or 1 km2 grids)

Accounts integration, analysis & reporting at various scales
- Accounts integration, analysis & reporting at various scales
- Administrative divisions, management areas...
- Socio-ecological units, river catchments or risk perimeters...

Data extraction

Examples of land and Ecosystem Natural Capital Accounts

Land and Ecosystem Accounts (LEAC): Sprawl of artificial areas 1990-2000

Land cover account for Europe: Urban Sprawl 1990-2000 (in red)

Total Ecosystem Capital Capability and Change in Mauritius (Provisional results)

Pilot ENCA for Mauritius:
Total Ecosystem Capability (in ECU) (left) and Change 2000-2010 (right)

Burkina Faso / IGB & IGNFI, 2009, LEAC/BDOT
Land cover account 1992-2002

Diachronic analysis and land cover account in Burkina Faso

ENCA for the Rhone River Catchment: NLEP (left), Change in NLEP 1990-2012 (middle) and Change in Small Rivers Ecological Condition 2009-2015 (right)
Examples of land and ecosystem natural capital accounts

Total Ecosystem Capital Capability and Change in Mauritius (Provisional results)

Total Ecosystem Capital Capability (inland):
ECU value by Socio-Ecological Landscape Units, 2010

Total Ecosystem Capital Capability (inland):
Change in ECU value, % by Socio-Ecological Landscape Units, 2000-2010

Experimental ENCA, Mauritius Case Study (IOC, 2014)
Source: UNCEEA meeting 2014

Net Landscape Ecological Potential (NLEP) 2012
Gains and Losses in NLEP 1990-2012
Change in Small Rivers Ecological Condition 2009-2015 (%)

Ecosystem Natural Capital Accounts of the Rhône River Basin
Preliminary results (Arguello J., Weber J.-L., Parmentier H. and Negrutiu I., 2018, ENS Lyon, France)

Land and Ecosystem Accounts in Europe: Sprawl of artificial areas 1990-2000

Source: European Environment Agency 2006

Liability to the Ecosystem: from local to global and vice-versa

- Ecosystem Natural Capital Accounts
- National Policies
- Sector Policies
- Regional Policies
- Local Policies
- Projects
- Enterprises (industry, agriculture, finance...)
- Citizens, households
- International Conventions: Climate, Desertification, Biodiversity Sustainable Development Goals

Global Ecosystem Natural Capital Accounts
(by countries, geographical regions ... for reporting to the 3 Rio Conventions (Climate Change, Desertification and Biodiversity), the SDGs, and rating of financial risks

Intermediation Platform(s):
Access to centralised data (Remote-sensing, In situ monitoring, Statistics),
Access to secondary data from agriculture, forestry, fishery, water management, Tools (Extraction algorithms, GIS, Accounts, Models, Self-Assessment APIs), Knowledge (Assessments, Indicators), Services (Diagnoses, Monitoring, Costs-Benefits of Projects, Certification, Financial Risk Rating...)

## The ECU Metrics and Policy Measures

### Policies to Halt or Mitigate Ecosystem Degradation

**Traditional policies**
- Regulations, command & control
- Fiscal policy, taxes, PPP
- **Public procurements** (conditionality)

**Novel or emerging policies involving all actors**
- Statement of ecosystem degradation & ecological debts
- **Green finance** (conditionality)
- **Rating sovereign and private financial risks**
- Integration of **ESG** (Environmental, Social and Governance) risks factors (OECD)
- **Nature offset payments & banking**

### Policies to Support Ecosystem Conservation & Enhancement

**Traditional policies**
- Public investments (conditionality)
- **Subsidies to programmes** (conservation, reforestation, organic agriculture, water treatment...)
- Public procurements (conditionality)

**Novel or emerging policies**
- Statement of ecosystem enhancement and ecological receivables for nature conservation and restoration
- **Green finance** (conditionality)
- **Nature offset payments and banking**

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*J.-L. Weber, 21 Feb. 2019*
ENCA at the Global Scale: the 3 Rio Conventions and SDGs

- Need of ecosystem natural capital accounts for better coordination of the 3 Rio Conventions on Climate Change, Desertification and Biological Diversity

- Need of ecosystem natural capital accounts for the Sustainable Development Goals (UN SDGs)
  - Accounting is explicitly mentioned in targets 15.9 and 17.19
  - Deliver for several targets on water, food security, natural risks, ecosystems...

- Possibility of a Global ENCA by 2020
  - Quick start, using the best accessible global datasets and computing capacities (ESA CCI, Copernicus Global, NASA, JAXA, FAO Stat...)
  - Global mapping & accounting for physical ecosystem degradation or enhancement
  - A dream? Presentation by EU at the CBD COP 15, in November 2020 in Beijing for framing the discussion of the so-called “2° biodiversity target”

Thank You!

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