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Progress Report of Economic-Environmental Accounts at the EEA

Paper prepared by EEA

(for information)

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Economic-environmental accounts at the EEA

Progress report[1]

The EEA is committed to several activities regarding economic-environmental accounting:

- Implementation of physical simplified ecosystem capital accounts for inland ecosystems. This project has a pivotal role in the development of accounts at the EEA and supports new approaches and applications.
- Experimental ecosystem accounts for coastal and marine ecosystems
- Experimental research on monetary benefits and costs associated to physical capital accounts
- Development of operational water accounts matching the Water Framework Directive requirements
- Material flow analysis of sustainable production and consumption
- Application of economic-environmental accounts to policy making, in particular the flagship initiative for a resource-efficient Europe under the Europe 2020 strategy.

1. Implementation of simplified ecosystem capital accounts

The fast track implementation of ecosystem capital accounts has been launched in an attempt to present a coherent response to major policy demands regarding economy and environment indicators by bringing together key indicators and produce a headline aggregate of ecosystem capital degradation. The experimental project has been launched in November 2009 is presently developing

[1] Prepared by Jean-Louis Weber, Special Adviser on Economic-Environmental Accounting at the European Environment Agency

a proof of concept of the relevance and feasibility of ecosystem accounts on the basis of existing monitoring data and statistics.

SECA = SIMPLIFIED ECOSYSTEM CAPITAL ACCOUNTS

- SIMPLIFIED ➔ Feasible in the short term for Europe and the Globe; first generation of accounts (as was SNA1953 of 36 pages!) is to be developed with more details at the national level; relevance (accounting concepts, assessment of trends, and policy use) is more important than accuracy; fast track implementation based on existing data (form Earth observation by satellite and in situ monitoring) and statistics.
- ECOSYSTEM ➔ Ecosystem units defined as socio-ecological systems; not all scales are addressed, only levels matching the description of the socio-economic systems; ecosystem accounting unit include atmosphere, sea and oceans, land ecosystems (forests, shrubs and grassland, wetlands, water bodies, agriculture and urban systems) and the below land systems which are directly connected to them: soil and aquifers. Statistical units for ecosystems are defined by their main characteristics and mapped.
- CAPITAL ➔ not all ecosystem structures and functions are addressed, only those which deliver ecosystem services and contribute to human wellbeing; ecosystem capital degradation doesn't refers to ecosystems in general but to their capacity of delivering services in a sustainable way; in conventional accounting systems, natural capital is restricted to the part which is owned and managed, therefore the need for complete ecosystem accounts covering private, common and public goods in order to measure positive and negative externalities and put the prices right.
- ACCOUNTS ➔ the purpose is to complete and improve the economics accounts presently used for policy making and respond to recurrent demands regarding economic progress measurement (national income, resource efficiency, correct price of the final demand...); ecosystem capital accounts need to match the typical space and time scales of policy making: national (and regional) territory, annual reporting for the previous year (requires nowcasting methodology, tested with QuickScan); accounting statements, including GDP relate to past and near-present, not to the future; they support (but don't replace) analysis, assessments and forecasts with robust data (verifiable, reproducible).

EXPECTED OUTCOMES FROM SECA:

- Measurement of ecosystem state and degradation based on multi-criteria analysis of a small number of basic accounts and indexes for land, water, biomass/carbon, biodiversity, disease prevalence and dependency from artificial input and summarised by 1 physical aggregate: Total Ecosystem Potential (or Capacity). Loss of TEP = ecosystem capital degradation.
- Measurement of key ecosystem services in physical units, starting with the provisioning (from agriculture, fishery and forestry) and regulating ones (carbon sequestration, water regulation…).
- Measurement of ecologically sustainable macro-economic benefits (Total Induced Value Added) from ecosystem services, starting with agriculture, forestry and fishery.
- Estimation of Consumption of Ecosystem Capital (CEC) as non-paid costs to remediate ecosystem degradation.

- Physical and monetary indicators of resource efficiency regarding ecosystems and biodiversity
- Ultimately, adjustment of National Accounts from CEC:
    - Net Domestic product or income reduced from CEC in addition to sub-soil assets depletion (consistently measured with the El Serafy user costs).
    - Adjustment of Imports and Exports from embedded transfers of CEC not recorded in commodities' value.
    - "Final Consumption at Full Price", increased of CEC on the domestic territory plus CEC in Import minus Exports.

PROGRESS OF SECA BY END OF MAY 2011

1. ecosystem state and degradation:
    a. Methodology:
        i. The definition of statistical units for ecosystem accounting has been stabilised; beyond the land cover functional units produced by Corine land cover, another category of Ecosystem Landscape Units has now been defined and implemented.
        ii. The difficult issue of biodiversity has been explored using Bayesian Belief Networks (multi-criteria decision trees incorporating probabilities) and will lead to a first application in July. The methodology will be used as well for achieving the multi-criteria diagnosis of ecosystem health from the basic accounts and indexes.
        iii. The progress of the "quick scan" related project allows now proposing methodologies for now-casting ecosystem accounts when necessary.
        iv. The use of the 1 km² standard European grid for assimilating various data and statistics proves to be an efficient solution in practice.
    b. Land accounts 1990-2006:
        i. Land cover stocks and flows: available
        ii. Derived products (displayed by 1 km² standard grid):
            I. Diffuse pressure from land use (CORILIS methodology): available
            II. Landscape Ecological Potential: available
        iii. Methodology for annual updates with NDVI wave lengths: in progress (in relation to QuickScan and GMES)
        iv. Additional layer on small linear features not mapped in Corine Land Cover: conditioned by the support to the project by ESA.
    c. Biomass/carbon accounts 2000-2010
        i. Test accounts for 2000 achieved by April; time series under process with methodology v0; upgrade this summer with methodology v1 (improved data and statistics inputs)
        ii. NPP calculation: need to revise standard products (based on MODIS, SPOT4-VEG); several issues identified (inadequate land cover data, ignorance of night temperatures, N fertilisation);
        iii. Harvesting of biomass (crops, grazed grass and wood): methodology combining Corine land cover, official statistics (FAO and Eurostat) and when relevant, NDVI annual variation tested;

iv. Estimation of stocks of biomass: FAO data for forests; agriculture and other soils using data from the European Soil Data Centre of the EC Joint Research Centre.

d. Water accounts
    i. Soil Humidity and Real Evapo-Transpiration have been recalculated with NDVI (Normalized Difference Vegetation Index), daily meteo data and Corine land cover for 2010.
    ii. Simplified water balances by river sub-basins: with improved ETR, water balances can be produced from data on precipitations and estimation of infiltration to soil and subsoil, uses being estimated from population density maps, CLC agriculture and the large dams database. The calculation could be calibrated with data on river discharge for the countries where such data has been collected in an appropriate way in the context of water accounting. Test this summer.
    iii. Water quality accounts could be sketched from countries reporting to WFD: maps of rivers by classes of quality, weighted by "standard river km" of each reach. Still to be decided.
    iv. Ecosystem capital depreciation: ongoing research based on WFD reporting on Good Environmental Status and estimations by rivers basin district of the total costs of the Programme of Measures to reach GES (Water Group).

e. Biodiversity accounts and indexes
    i. Ecotones 1990-2000-2006: database ready;
    ii. No basic account of species but indexes based inventories:
        I. Article 17 reporting reprocessing: tests done with 10 km grid; 1 km grid in February. Multicriteria analysis of the variables (state vs. perspective) to continue.
        II. Specialisation of Communities Index: developed by the French MNHN and the EEA's ETCBD.
    iii. Multicriteria diagnostic combining land (LEP, ecotones…) and species indexes: first tests March-April 2011, first application in July.

f. Other accounting modules are at exploration stage

2. Measurement of key ecosystem services in physical units:
    a. Provisioning: Breakdown of crops and timber harvest statistics by 1 km² grid.
    b. Multi-criteria approaches for mapping changes in ecosystem service potential at European scales: methodological research and test application for four ecosystem services "crop based production", "wildlife products", "habitat diversity" and "recreation"
3. Measurement of ecologically sustainable macro-economic benefits (Total Induced Value Added) from ecosystem services, starting with agriculture, forestry, fishery and water management.
    a. Extraction of Value Added from Input-Output Tables (Eurostat, EU27, 1998-2008): first test for Germany and Denmark this summer – by ETCSCP
    b. Calculation of ecological sustainability coefficients (ecosystem degradation) by 1 km² grid (from actions 1 and 2 above)
4. Calculation of Ecosystem Capital Consumption

a. Research for Water restoration costs: analysis of the country reporting (by catchments) to the Water Framework Directive re the cost of measures to meet the target of "good environmental quality". Second phase in 2011.
b. Exploration of possible estimation methodologies (e.g.: price or replanting hedgerows applied to micro-features index (1.a.iv) or cost of yields reduction in agriculture).

5. Adjustment of National Accounts: discussion postponed to 2012

OUTREACH OF ECOSYSTEM CAPITAL ACCOUNTS

The European experience in ecosystem accounting has been presented in the past months in various events of which

- The Pan-African Conference on Biodiversity: "Biodiversity and Poverty Alleviation: What Opportunities for Africa?" Libreville, Gabon, 13–17 September 2010 (CBD)
- The CBD COP10 in Aichi-Nagoya, Japon, October 2011
- The World Bank's WAVES 1st Partner meeting, 29-31 April 2011
- The GDP and Beyond EC "inter-service" Seminar, 10 May 2011
- The Nairobi UNEP/GEF ProEcoServ Inception meeting 7-8 June 2011
- And in academic events

The approach is reflected as well in the TEEB D1 Report "The Economics of Ecosystems and Biodiversity in National and International Policy Making" Chapter 3 "Strengthening indicators and accounting systems for natural capital" to which the EEA has contributed.

Last but not least, SECA is well known from the international community of economic-environmental accountants… The EEA is participating in the drafting of SEEA part 2 with UNSD and the WB and has co-organised the first expert meeting held in Copenhagen 11-13 May 2011.

2. Other activities in environmental accounting

Although they relate more or less closely to ecosystem capital accounts and have been addresses before, other activities related to environmental accounts at the EEA need to be highlighted.

WATER

One important step towards full-fledged water accounts by river basins has been accomplished this spring with the delivery of the first version of ECRINS, the European reference layer for river basins and rivers. Because of this progress, DG ENV supports an additional effort to collect data in countries (circa half of EEA member countries) which don't report to the EEA with the requested detail (although the information is in most cases locally available). As mentioned above, novel assessments of soil humidity and evapotranspiration have been produced.

At the same time, the EEA is committed to lead the update of the report on 'Water Footprint and Accounting' produced by the UNEP International Resource Panel.

SUSTAINABLE CONSUMPTION AND PRODUCTION

In this area, the EEA is using the material flows and input-output data (including NAMEA) produced by Eurostat. This cooperation between EEA, its European Topic Centre on SCP (ETC-SCP) and Eurostat is active as well regarding applications and assessments. Both organisations participate in the activities organised by OECD in this area.

Material flow accounts have been a significant input to the thematic assessment of "Material resources and waste" published in the framework of the EEA SOER 2010 report.

COASTAL AND MARINE ECOSYSTEM ACCOUNTS

Although they are not part of the fast track implementation project, reflexions on accounts for the coastal ecosystem and for the marine ecosystem are going on. Two issues are debated. The first one is technical and relates to the definition of accounting units for the sea. The second issue relates to the purpose of departing from the conventional measurement of fish stocks depletion measured via fishermen' income towards a measurement based on physical accounts. This second approach would allow considering fisheries (which are ecosystems) instead of stocks. It poses problems of access to the relevant statistics of catches by origin and downloads by destination.

ENVIRONMENTAL ACCOUNTS AND HEADLINE RESOURCE EFFICIENCY INDICATORS

The European Union has launched end of 2010 a "flagship initiative for a resource-efficient Europe" under the Europe 2020 strategy. This initiative aims at supporting "the shift towards a resource-efficient, low-carbon economy to achieve sustainable growth". Accordingly, there is a policy demand for a headline indicator in this domain and the EEA participates to the technical discussions with DG ENV, Eurostat and the EC JRC.

At this stage, the short term solution is to start with an indicator of resource efficiency based on material flow accounts: GDP/DMC. However, the discussions have emphasises the need for more robust indicators regarding 1/ that DMC (Direct Material Consumption) doesn't address the impacts on the ecosystems and 2/ that the current format of DMC sets aside land and water resources while giving in its composition an excessive weight to sand and gravel – thus blurring progress to low carbon economy and the difficult trade-offs between uses of fossil and biological carbon. A tiered approach is currently envisaged in the current discussions, which means that the outcome of ecosystem capital accounts is expected for supplying one part of the information.