



# **A global framework for natural capital accounting - the System of Environmental- Economic Accounting (SEEA)**

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# Overview of presentation

- *Basic idea of environmental accounting*
- *System of environmental-economic accounting 2012 (SEEA central framework) and SEEA Experimental ecosystem accounts*
- *Natural capital in the SEEA*
- *SEEA asset accounts for land, forests, fish, etc.*
- *SEEA ecosystem accounting*
- *Lessons learnt and conclusions*

# Environmental accounting

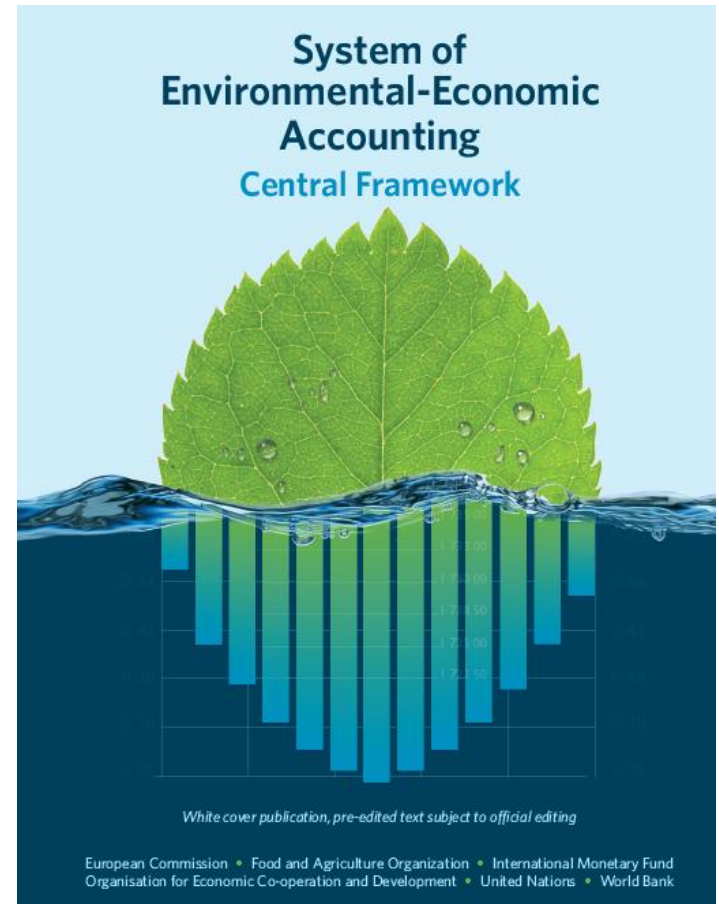
- *Presents environmental information in a way that is compatible with national accounts using the same concepts and classifications*
- *Integrates existing data into a coherent system*
- *Allows analysis and modelling of environmental effects of economic activities and of policy measures – integrated set of statistics linking flows and stocks*
- *Basic frameworks supply-use tables and balance sheets*
- *Main areas:*
  - **Physical flow accounts**
  - **Monetary environmental accounts**
  - **Asset accounts (physical and monetary)**
  - **Recently research in ecosystem accounting**

# The world-wide System of Environmental-Economic Accounting (SEEA)

- **1993:** *Handbook – interim publication by UN*
- **2003:** *Updated SEEA handbook – UN, IMF, OECD, World Bank and European Commission*
- **2012: SEEA – central framework (2012 SEEA or SEEA CF)** *(international statistical standard adopted by the United Nations Statistical Commission in March 2012) – will be **published by European Commission, FAO, IMF, OECD, UN, World Bank***  
*Chapter 5 – Asset accounts*
- **2013: SEEA – Experimental ecosystem accounting**
- **2013: SEEA – Applications and Extensions** *(complement to SEEA CF)*

# The SEEA 2012 central framework

- **Accounting approach: measures stocks and flows in integrated manner, aligned with System of National Accounts**
- **Broad and inclusive approach covers physical and monetary flow accounts as well as asset accounts**
- **Physical flow accounts: flows of energy, water, products (incl. minerals, wood, fish...), emissions to air, waste...**
- **Monetary flow accounts: envt expenditure, taxes and subsidies, envt goods and service sector**
- **Asset accounts: mineral and energy resources, land (land use and land cover accounts, changes), soil, timber, aquatic resources (fish stocks etc.), other biological resources, water**



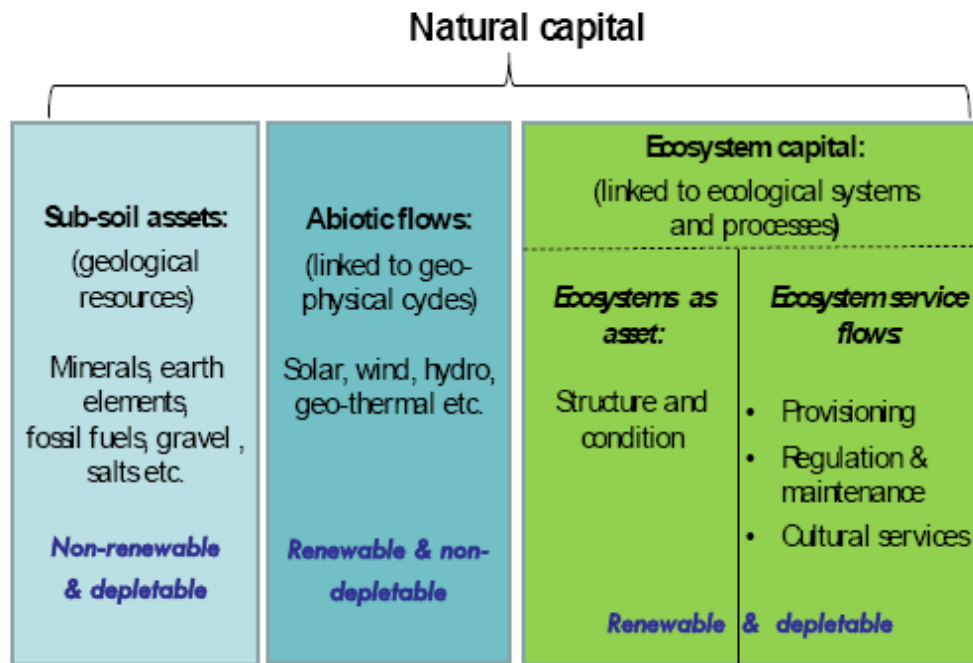
# Natural capital

- 1. Natural resources such as stocks of minerals and energy, forest timber, land, fish stocks and water. (SEEA CF -> approach by individual resource -> generally SNA assets included in national accounts balance sheets -> some biotic, others abiotic)***
- 2. Ecosystems producing services that are in part not captured by markets such as air and water filtration, flood protection, carbon storage, habitat for fisheries and wildlife. (SEEA experimental ecosystem accounts -> approach by ecosystem -> some values included in the national accounts, others not)***

# Natural capital and accounting

- Natural capital includes biotic and abiotic elements
- It includes renewable and non renewable resources

## Components of Natural Capital:



**SEEA Experimental ecosystem accounting – focus on biotic component of natural capital (assets that require a living component). Includes non-SNA components.**

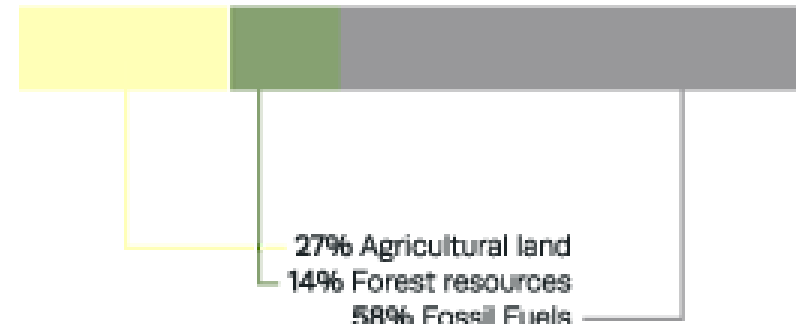
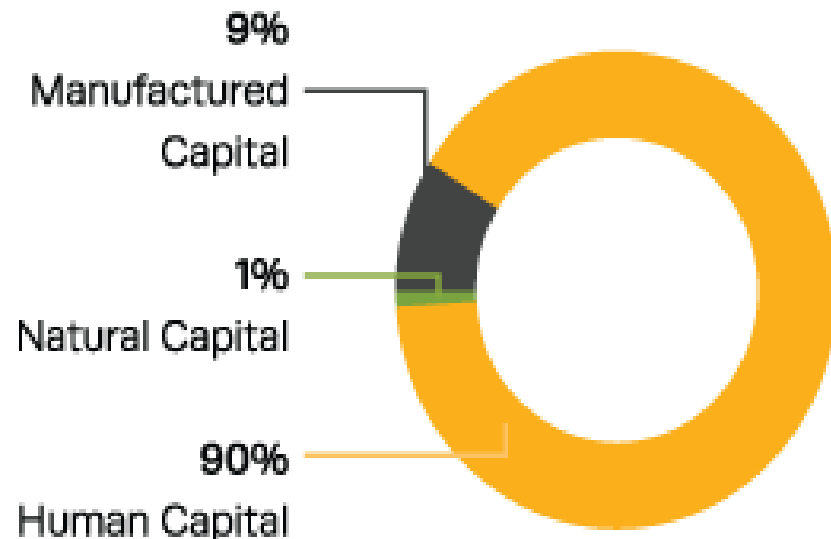
European Environment Agency

*Source: European Union (2013). Mapping and assessment of ecosystems and services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020. Discussion paper. Publications office of the European Union, Luxembourg.*

**SEEA CF – SNA assets. Includes sub-soil assets, land itself, certain assets that offer provisioning services (fish stocks, forests, some sources of water)**

# Composition of UK's Natural Capital

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# Canada's natural resource assets and national wealth

## Natural resource assets and produced assets annual (dollars x 1,000,000)

Categories	2007	2008	2009	2010	2011
Tangible assets	6,921,644	7,895,586 <sup>r</sup>	7,202,442 <sup>r</sup>	7,711,890 <sup>r</sup>	8,224,864
Selected produced assets	4,023,882	4,280,401 <sup>r</sup>	4,359,974 <sup>r</sup>	4,505,363 <sup>r</sup>	4,721,513
Residential structures	1,593,218	1,668,769 <sup>r</sup>	1,697,729 <sup>r</sup>	1,801,020 <sup>r</sup>	1,905,593
Non-residential structures	1,362,498	1,502,065 <sup>r</sup>	1,534,441 <sup>r</sup>	1,588,577 <sup>r</sup>	1,681,043
Machinery and equipment	441,785	466,181 <sup>r</sup>	487,131 <sup>r</sup>	459,426 <sup>r</sup>	451,246
Consumer durable goods	399,905	402,593 <sup>r</sup>	412,366 <sup>r</sup>	426,831 <sup>r</sup>	441,242
Inventories	226,476	240,793 <sup>r</sup>	228,307 <sup>r</sup>	229,509 <sup>r</sup>	242,389
Selected non-produced assets	2,897,762	3,615,185 <sup>r</sup>	2,842,468 <sup>r</sup>	3,206,527 <sup>r</sup>	3,503,351
Land	1,708,196	1,832,780 <sup>r</sup>	1,905,946 <sup>r</sup>	2,004,683 <sup>r</sup>	2,108,412
Timber	245,187	233,005 <sup>r</sup>	188,523 <sup>r</sup>	165,923 <sup>r</sup>	147,513
Subsoil resource stocks	944,379	1,549,400 <sup>r</sup>	747,999 <sup>r</sup>	1,035,921 <sup>r</sup>	1,247,426
Selected energy resources <sup>1</sup>	673,898	1,218,644 <sup>r</sup>	576,851 <sup>r</sup>	753,859 <sup>r</sup>	879,437
Selected mineral resources <sup>2</sup>	270,481	330,756 <sup>r</sup>	171,148 <sup>r</sup>	282,062 <sup>r</sup>	367,989

### Symbol legend:

r Revised

### Footnotes:

1. Includes crude oil, natural gas, crude bitumen and coal.

2. Includes gold, iron, copper, nickel, lead, zinc, molybdenum, uranium, diamonds and potash.

# SEEA Experimental Ecosystem Accounting

- *Extends beyond SEEA CF*
- *Integrated statistical framework for accounting for ecosystem assets and ecosystem services (provisioning, regulating and cultural services)*
- *Experimental – aims at giving structure and direction to research and testing in advanced countries*
- *Adds clarity – definitions and classifications – assets (capital stocks) and services that flow from these assets*



# Key aspects of the framework for experimental ecosystem accounting

*Statistical units (basic spatial units - BSU, land cover/ecosystem functional units - LCEU and ecosystem accounting units - EAU).*

*Classification of ecosystem services (CICES)*

- **Provisioning services (food, fibres etc.)**
- **Regulating services (air and water clean-up, flow regulation, etc.)**
- **Cultural services (recreation, knowledge...)**

*Ecosystem assets*

- **Ecosystem extent**
- **Ecosystem condition (measured through a range of indicators of characteristics)**
- **Expected ecosystem service flows**

*Degradation and enhancement*

# Valuation of ecosystem services and ecosystem assets

- *Some prices and values embedded in market prices of marketed products (fish, timber, agricultural outputs) and marketed assets (land)*
- *Other prices are "missing" reflecting externalities and that many ecosystem services are public goods*
- *Non-market valuation techniques commonly used to place a value on the welfare impact of losing or gaining ecosystem services*
- *For accounting purposes want a measure **not welfare value but exchange value** excluding consumer surplus*
- *For assets: complexity of determining future supply profile – cannot assume current use is sustainable*
- *Defining and valuing degradation very challenging*

## Lessons already learnt

- *Cooperation is essential – between agencies and between professions (e.g. accountants, economists and ecologists)*
- *Spatial data and spatial manipulation of data are needed (requires integration of large data sets possibly from different places – choose as host someone who can handle large data sets)*
- *Experimental or pilot studies are useful for developing methods, building capability and demonstrating how accounts can be used*
- *Need to focus on repeatability (i.e. the regular production of accounts) – need simple pragmatic solutions*
- *There will be criticism – the work requires trade-offs between accuracy and frequency (especially if annual production is the aim) as well as fitting imperfect data to the accounting tables – start simple, refine in next round*

## Conclusions and outlook

- *Environmental accounts offer an opportunity to compile and present data in a new way*
- *The SEEA Experimental ecosystem accounting provides basic terms and concepts for testing*
- *Starting point is land use and land cover accounts using spatial units adapted to needs of ecosystem accounting*
- *Further layers of data can be added as appropriate and available (leaf area index, net primary production, water availability and use, soil types, harvest data, etc.)*
- *Need to base accounts on the data generated already via satellites, reporting systems and main-stream statistical systems complemented by estimates where needed - > design information systems*
- *Leadership needed – in Europe the European Environment Agency*

## Useful links:

For more detail on Eurostat work (data, handbooks, publications) see:

[http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental\\_accounts/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/introduction)

SEEA Central Framework:

[http://unstats.un.org/unsd/envaccounting/White\\_cover.pdf](http://unstats.un.org/unsd/envaccounting/White_cover.pdf)

SEEA Experimental Ecosystem Accounting (currently being edited – new version soon):

<http://unstats.un.org/unsd/statcom/doc13/BG-SEEA-Ecosystem.pdf>

SEEA Applications and Extensions (currently being edited – new version soon):

<http://unstats.un.org/unsd/statcom/doc13/BG-SEEA-AE.pdf>

# Regulation EU 691/2011 on European environmental economic accounts

*Includes 3 modules (data delivery from 2013)*

- **Air emissions (14 pollutants x NACE A\*64 + households)**
- **Environmental taxes (4 types x NACE A\*64 + households)**
- **Material flow accounts**

*3 new modules now in Council WG (data from 2017?)*

- **Environmental protection expenditure**
- **Environmental goods and services account**
- **Energy accounts**

*691/2011 mentions possible future areas, e.g.*

- **Forest accounts** (where sources and methods are advanced)
- **Ecosystem services accounts**

*European strategy for environmental accounting*

- **Consolidation and quality improvement of current 3+3 modules**
- **Few new development areas (ecosystem accounts = EEA!)**