

Presentation Overview



- I. Why Environmental-Economic Accounting? What is it about?
- II. Experimental Ecosystem Accounting
- III. Examples
- IV. Main concepts of environmental-economic accounting
- V. The links between FDES 2013 and SEEA 2012
- VI. SEEA-CF 2012 / FDES 2013 / Green Growth: Implement in coordination
- VII. SEEA and the SDG Indicators
- VIII. Conclusion



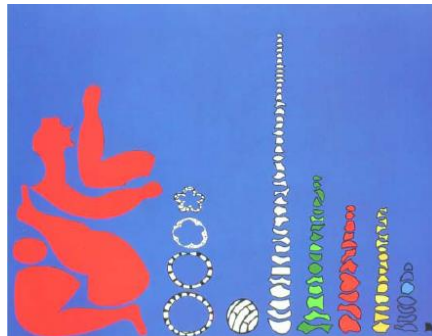
I. Why Environmental-Economic Accounting? What is it about?



Why make environmental accounts? Aren't environmental statistics enough?

Statistics

- Often developed to answer one particular question or problem.
- Difficult to figure out if all information is included.
- Not always easy to see the whole picture, or how it relates to other things.





Why make environmental accounts? Aren't environmental statistics enough?

Environmental accounts

- Helps to make sense of the larger picture.
- Helps to identify pieces that are missing
- Can make connections to other statistics - especially economic statistics



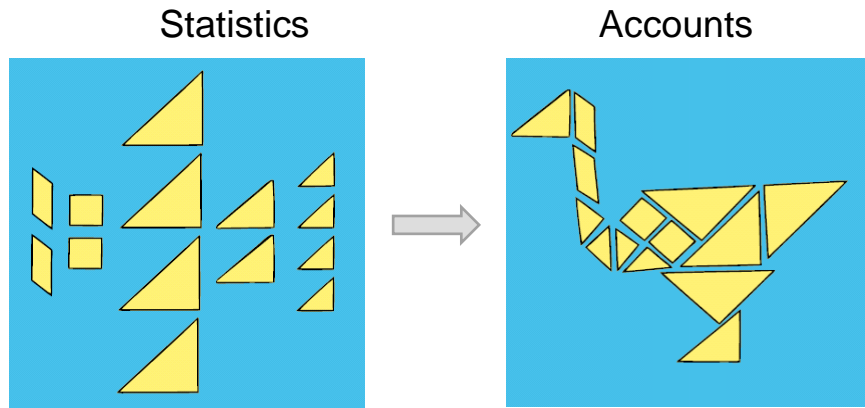
SEEA responds to complex policy questions such as



- How can natural resources be used sustainably? What is the impact of regulatory environmental measures on different economic sectors and households?
- How do ecosystems contribute to the well-being of people and to the economy?
- Which are the most cost-efficient measures to improve the state of the environment?
- What are the effects of environmental taxes on the environment and on the economy?
- Etc.

From Statistics to Accounts

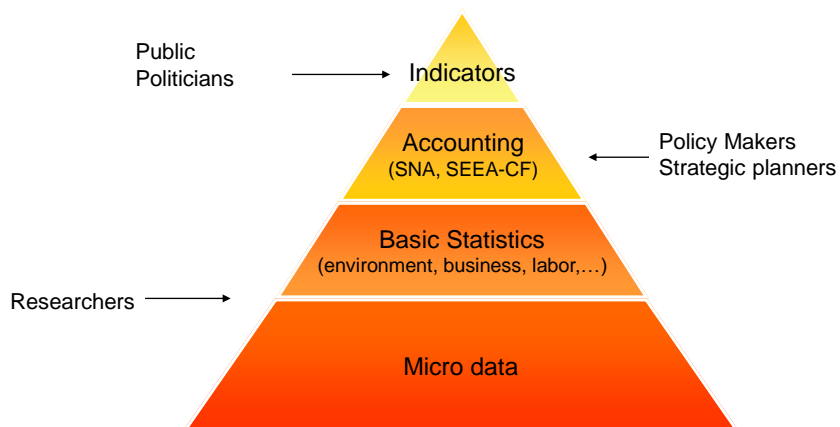
SEEA integrates environment and economic statistics by following the same statistical principles (those of the System of National Accounts)



Source: United Nations Statistics Division

**Stocks and flows in
physical and monetary terms**

Audiences for information



SEEA is considered as an underlying framework by international initiatives



- Monitoring Sustainable Development Goals
- OECD: Towards Green Growth
- European Union: Beyond GDP
- Conference of European Statisticians: Set of key Climate Change related Indicators
- World Bank: Wealth Accounting and the Valuation of Ecosystem Services
- Etc.

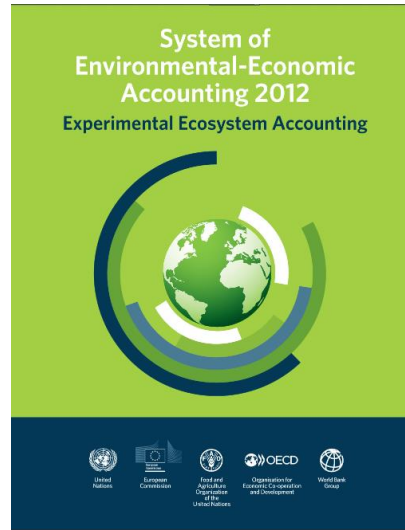
SEEA Central Framework



- Internationally agreed statistical framework to measure environment and its interactions with economy
- Adopted as international statistical standard by UN Statistical Commission in 2012
- Developed through inter-governmental process
- Published by UN, EU, FAO, IMF, OECD, WB



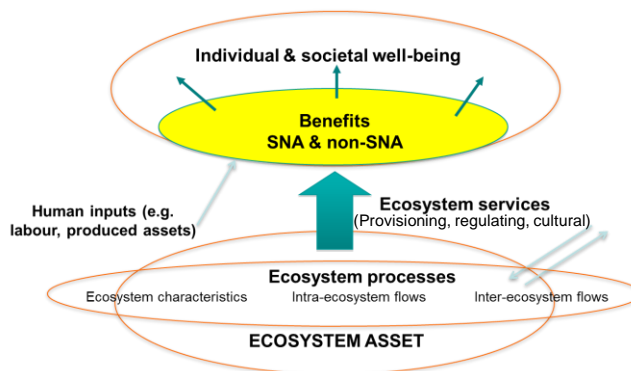
II. Experimental Ecosystem Accounting



Why ecosystem accounts?

To better understand:

- The impacts of ecosystem change on people
- Potential response options (mitigate, adapt)
- The effects, and cost/benefit ratio of response options





SEEA-Experimental Ecosystem Accounting - Background

- Complements SEEA Central Framework with focus on ecosystems perspective
- Developed as part of broader process of revising SEEA 2003
- “Experimental” because significant methodological challenges remain and further testing of concepts needed



Relationship to SEEA Central Framework

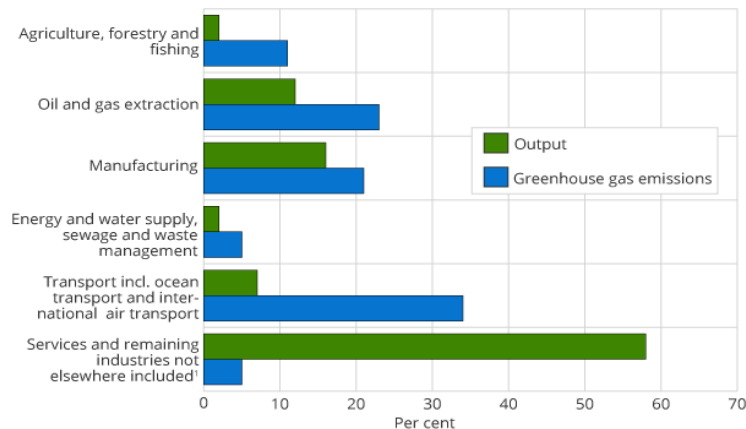
- Extends range of flows (production boundary) for accounting compared to SNA and SEEA in physical and monetary terms
- Many flows from Central Framework also included in Experimental Ecosystem Accounting (e.g. flows of timber), but extension of EEA is to attribute flows to spatial areas
- Some Central Framework natural input flows are excluded from Experimental Ecosystem Accounting (e.g. mineral and energy resources)

III. Examples



Example Norway (1/2): «Profile» with output and GHG emissions by industry – who contributes the most

Figure 3. Greenhouse gas emissions (CO₂-equivalents) and output (fixed 2005-prices) divided according to industries and share of totals. 2012



¹ Services, energy and water supply and construction, education, health and social work and general government administration.
Source: Statistics Norway.

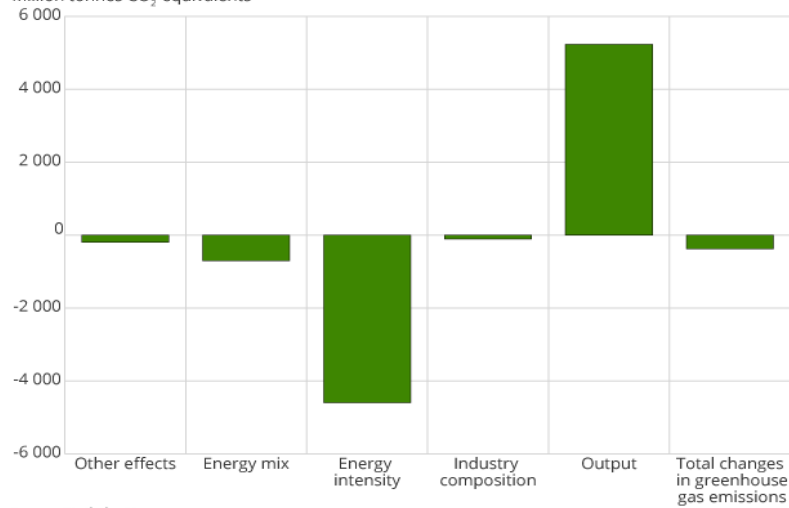


Example Norway (2/2): Decomposition Analysis – causes of the observed changes from one year to another



Figure 5. Effects causing changes in greenhouse gas emissions (decomposition) between 2011 and 2012

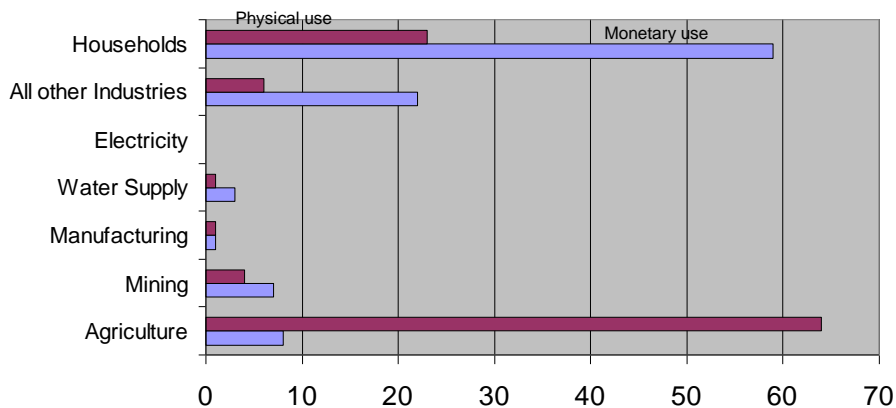
Million tonnes CO₂-equivalents



Source: Statistics Norway.



Example Australia: Monetary versus physical use of distributed water (% of total use)



Modelling Effects of Price Changes: Murray-Darling River Basin Australia

Based on historical water use & price data, simulated impact on GDP of doubling water prices and the expected increases in water use efficiency (WUE) of 1-2%

| | Increase in GDP, A\$million | |
|---------------------------|-----------------------------|-------------------|
| | 1%increase WUE | 2%increase WUE |
| Irrigated agriculture | -24 | 78 |
| Dryland agriculture | -51 | -112 |
| Food and fibre processing | 44 | 97 |
| Other industries | 262 | 410 |
| Total impact on GDP | 253 | 521 |



Netherlands: Measuring green growth

Objective:

- Assess the state of green growth in the Netherlands
- Benchmark for a more thorough and comprehensive assessment of green growth in the future

- **Point of departure: OECD indicators**
- *Data availability*
- *Robustness of indicators*
- *Relevance for the Netherlands*
→ **List of 20 relevant indicators**

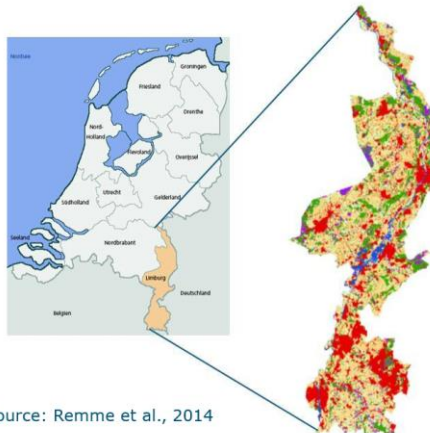
Project was completed in only 2 months



Ecosystem account example 1/3

Ecosystem production account example: Limburg province the Netherlands

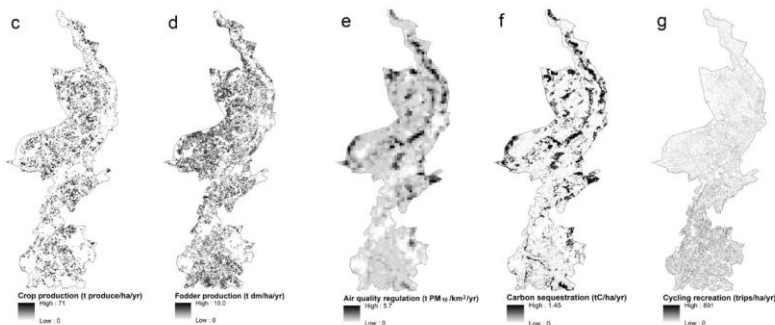
- Biophysical ecosystem account developed for Limburg Province, the Netherlands
- 2200 km², 1.1 million inhabitants
- Analysis of 7 ecosystem services



Source: Remme et al., 2014

Ecosystem account example 2/3

Ecosystem production accounts Limburg, NLs



Source: Remme et al., 2014

Ecosystem account example 3/3



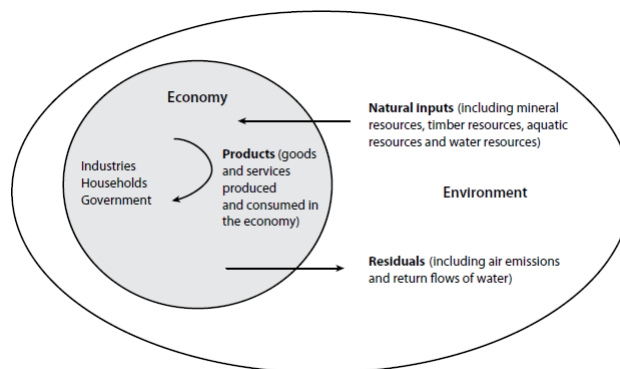
Ecosystem production account table Limburg

| LCEU | Ecosystem service | | | | | | | | | | | | | |
|------------------|-------------------|--|-------------------|---|--------------------------------------|--|---------|---|------------------------|---|-----------------------------|--|-----------------------|---|
| | Crop production | | Fodder production | | Drinking water extraction | | Hunting | | Air quality regulation | | Forest carbon sequestration | | Recreational cycling | |
| | Total | Mean (SD) | Total | Mean (SD) | Total | Mean (SD) | Total | Mean (SD) | Total | Mean (SD) | Total | Mean (SD) | Total | Mean (SD) |
| | Mtons MEQ | kg MEQ ha ⁻¹ yr ⁻¹ | ktons dm | kg dm ha ⁻¹ yr ⁻¹ | 10 ³ m ³ water | m ³ water ha ⁻¹ yr ⁻¹ | kg meat | kg meat km ⁻² yr ⁻¹ | tons PM ₁₀ | kg PM ₁₀ km ⁻² yr ⁻¹ | ktons C | kg C ha ⁻¹ yr ⁻¹ | 10 ³ trips | trips ha ⁻¹ yr ⁻¹ |
| Pasture | - | - | 521 | 12,041 (1,573) | 9,110 | 3,099 (2,231) | 9,100 | 21 (17) | 405 | 911 (532) | - | - | 1,872 | 103 (78) |
| Cropland | 2.46 | 36,314 (1,785) | - | - | 14,855 | 3,082 (2,422) | 14,732 | 20 (17) | 715 | 956 (534) | - | - | 2,631 | 99 (73) |
| Forest | - | - | - | - | 4,577 | 3,214 (2,624) | 8,100 | 24 (20) | 686 | 2,040 (1,221) | 55 | 1,563 (263) | 1,472 | 126 (94) |
| Water | - | - | - | - | 3,289 | 9,460 (3,698) | - | - | 40 | 624 (569) | - | - | 147 | 110 (92) |
| Urban | - | - | - | - | 7,862 | 4,321 (3,527) | - | - | 285 | 547 (562) | - | - | 2,735 | 70 (57) |
| Heath | - | - | - | - | 219 | 1,293 (821) | 678 | 32 (25) | 45 | 2,062 (1,111) | - | - | 30 | 82 (59) |
| Peat | - | - | - | - | 0 | 0 (0) | 70 | 13 (3) | 7 | 970 (345) | - | - | 3 | 92 (44) |
| Other nature | - | - | - | - | 1,187 | 3,093 (2,567) | 1,513 | 25 (20) | 69 | 1,155 (710) | - | - | 226 | 128 (93) |
| Provincial total | 2.46 | | 521 | | 41,099 | | 34,193 | | 2,252 | | 55 | | | |

Source: Remme et al., 2014



IV. Main concepts of environmental-economic accounting

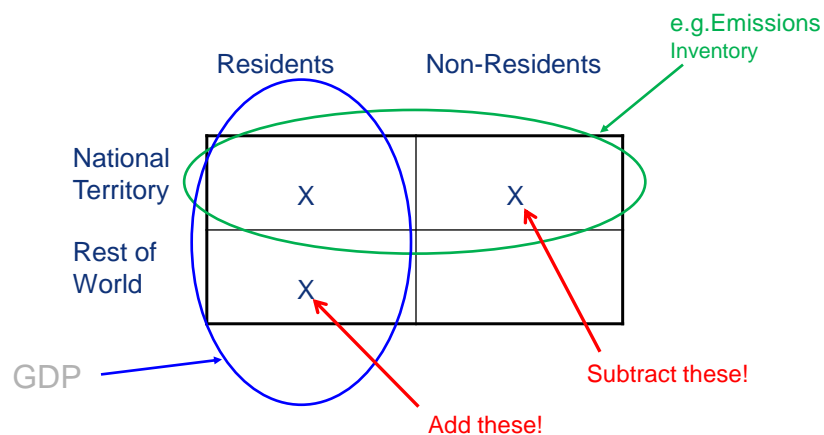


Environmental accounts are satellite accounts to the System of National Accounts (SNA)

- What is “wrong” or missing from the SNA?
- Values of natural resources not included in the national accounts until they enter the economic system.
- In other words, in the SNA,
 - A tree has no value until it is cut down.
 - GDP increases with environmental accidents since economic activity is stimulated. No negatives are included for damage to the environment.



Difference between SNA boundary and territory boundary (Main difference is usually international transport)





Need to make the environmental statistics/accounts correspond to the national accounts definitions

- ☐ What about imports and exports? Need to be included since part of national accounts.
- ☐ Double counting? Are units counted 2 times?
- ☐ Production boundary for national accounts different than for physical data?
- ☐ Territorial definition (e.g. Greenhouse Gas Emissions Inventory vs. economic definition (national accounts))



Guidelines & framework: SEEA System of Environmental Economic Accounting

a) SEEA Central Framework: (https://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf)

- Integration framework consisting of agreed concepts, definitions, classifications and accounting tables for environmental accounting
- Common concepts (e.g. residence) and classifications (ISIC, CPC) as in the National Accounts (SNA)
- Includes complementary elements (e.g. physical information, etc.)

b) SEEA extensions and applications: Country examples

c) SEEA experimental ecosystem accounting: Enlarged asset boundaries



Systems of Environmental and Economic Accounting Central Framework (SEEA-CF, 2012)

1. Physical Flow Accounts
2. Environmental Activity Accounts and related flows
(Economic accounts related to environment)
3. Asset accounts in physical and monetary terms
4. Integrated or combined accounts (hybrid, 'NAMEA')



1. Physical Flow accounts

- Physical flow accounts (material flows)
 - Measured in physical units (for example: tonnes)
 - Natural resources and Products (for example, water, energy)
 - Residuals (pollution): emissions to air, water emissions/pollution, waste
- Physical Supply and Use Table (PSUT)
 - Nature is added into the monetary SUT format
 - Table 3.1 in SEEA-CF 2012

Start with SNA Supply and Use Table (SUT)

Table 2.1
Basic form of a monetary supply and use table

| | Industries | Households | Government | Accumulation | Rest of the world | Total |
|---------------------|--------------------------|---|--|--|-------------------|--------------|
| Supply table | | | | | | |
| Products | Output | | | | Imports | Total supply |
| Use table | | | | | | |
| Products | Intermediate consumption | Household final consumption expenditure | Government final consumption expenditure | Gross capital formation (including changes in inventories) | Exports | Total use |
| Value added | | | | | | |

Note: Dark grey cells are null by definition.

https://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf

SEEA-CF: Physical Supply and Use Table – extended to include the environment

Table 2.2
Basic form of a physical supply and use table

| | Industries | Households | Accumulation | Rest of the world | Environment | Total |
|---------------------|---|--|--|-------------------|--------------------------------------|--------------------------------|
| Supply table | | | | | | |
| Natural inputs | | | | | Flows from the environment | Total supply of natural inputs |
| Products | Output | | | Imports | | Total supply of products |
| Residuals | Residuals generated by industry | Residuals generated by final household consumption | Residuals from scrapping and demolition of produced assets | | | Total supply of residuals |
| Use table | | | | | | |
| Natural inputs | Extraction of natural inputs | | | | | Total use of natural inputs |
| Products | Intermediate consumption | Household final consumption | Gross capital formation | Exports | | Total use of products |
| Residuals | Collection and treatment of waste and other residuals | | Accumulation of waste in controlled landfill sites | | Residual flows direct to environment | Total use of residuals |

Note: Dark grey cells are null by definition. Blank cells may contain relevant flows, which are explained in detail in chapter III.

https://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf

2. Economic accounts- flows: What are we spending now?



Environmental Protection Expenditure Accounts
Environmental Goods and Services
Policy instruments – taxes, subsidies, permits

- Information is already included in the SNA. Goal is to separate it from the standard accounts to show who is spending how much on environmental protection.
- Economic information about environmental protection activities
 - Supply: Environment industry – environmental goods & services
 - Demand: environmental protection expenditure by industries and government
- Environmentally related taxes, subsidies and permits

3. Asset accounts in physical and monetary terms – General structure



Table 2.3

Basic form of an asset account

| |
|---------------------------------------|
| Opening stock of environmental assets |
| Additions to stock |
| Growth in stock |
| Discoveries of new stock |
| Upward reappraisals |
| Reclassifications |
| Total additions of stock |
| Reductions of stock |
| Extractions |
| Normal loss of stock |
| Catastrophic losses |
| Downward reappraisals |
| Reclassifications |
| Total reductions in stock |
| Revaluation of the stock ^a |
| Closing stock of environmental assets |

- Same format for both physical and monetary units

- Types of natural resource assets:

- Mineral and energy resources
 - Oil, natural gas, coal
 - Minerals – metallic and non-metallic
- Timber resources
- Aquatic resources

^a Only applicable for asset accounts in monetary terms.



4. Integrated or combined accounts (Hybrid or 'NAMEA')

- Combined accounts (key: same industry classifications)
 - Linking physical and national accounts data together
 - Thereby showing the relationships between economic activity and environmental consequences
 - Can be used for analysing industries that are important contributors to pollution
- Ratio indicators – often used in 'Green Economy' indicators
- Main data set for analysis purposes – ratio, profiles, decomposition, ee I-O...

NAMEA = National Accounting Matrix including Environmental Accounts



Advantages/disadvantages of the NAMEA system

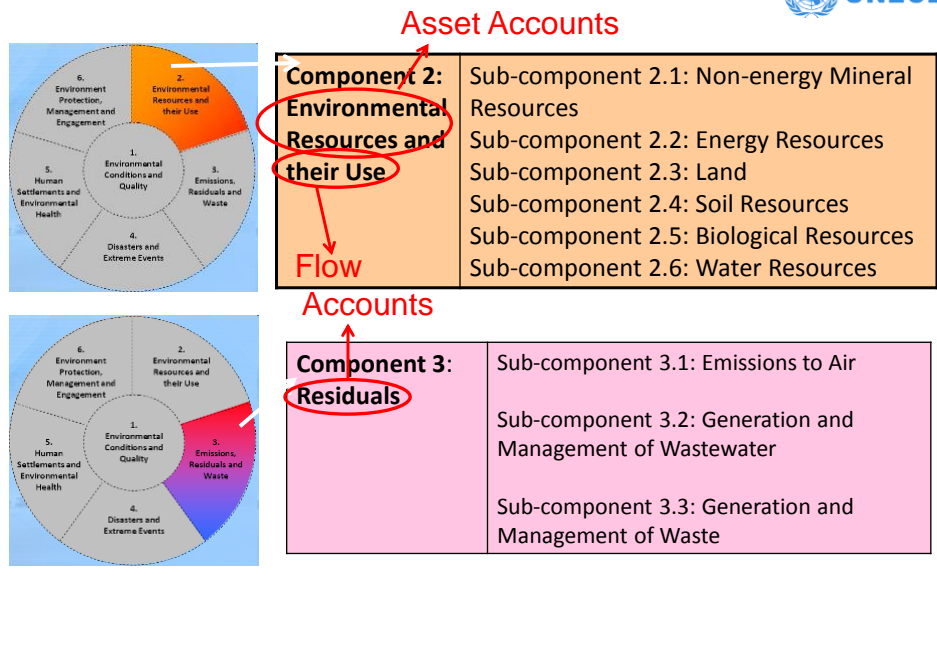
• Advantages

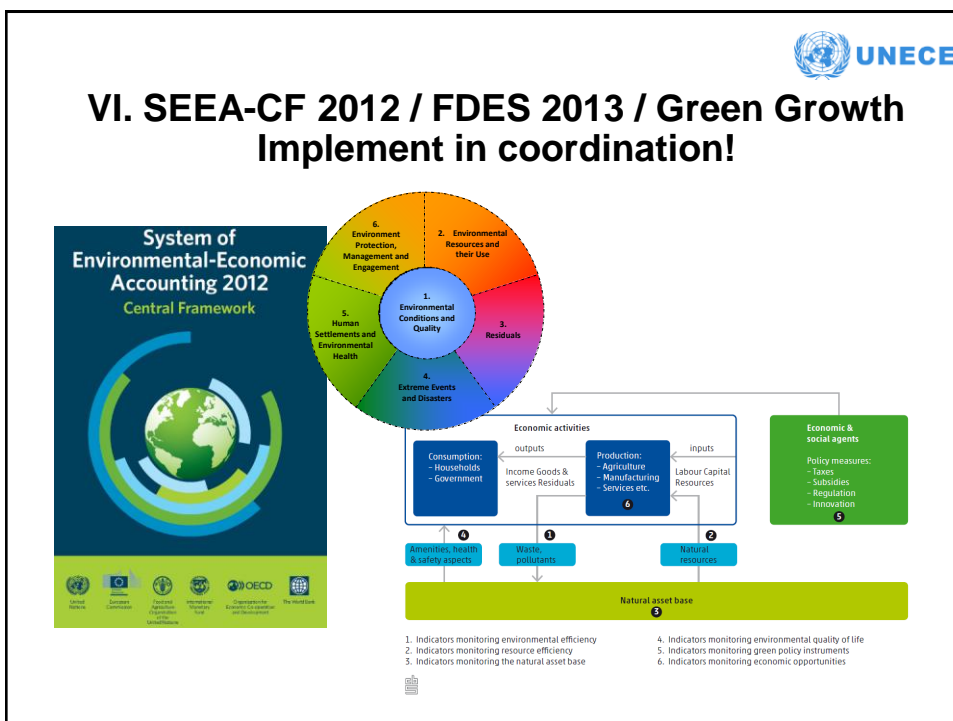
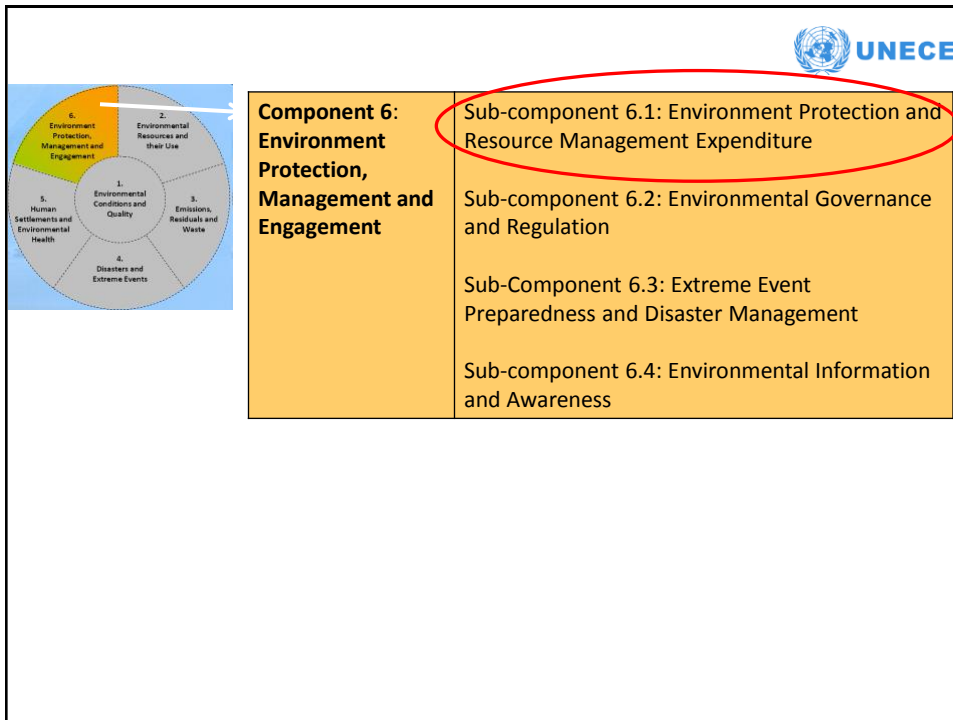
- Helps to keep everything organized
- Helps to identify missing pieces, double counting
- Can be developed step-by-step
- Can connect to the national accounts
- Consistent data for indicators
- Use for analysis: Decomposition, Input-output techniques


• Disadvantages

- Big and complicated to present
- Matrix is not easy for people to understand
- Lots of information! Hard to figure out what is important

V. The links between SEEA 2012 and FDES 2013








OECD: Green Growth Indicators

<http://www.oecd.org/greengrowth/greengrowthindicators.htm>



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Green growth and sustainable development

Green growth indicators

- > Consumption, innovation and the environment
- > Economic policies to foster green growth
- > Environmental policy tools and evaluation
- > Fisheries
- > Greening cities, regions and communities
- > Green growth and development
- > Greening energy
- > Greening jobs and skills
- > Greening transport
- > Sustainable agriculture

Policies that promote green growth need to be founded on a good understanding of the different factors that affect green growth, and appropriate information is needed to monitor progress and measure results.

Monitoring progress towards green growth requires indicators based on internationally comparable data. These need to be embedded in a conceptual framework and selected according to well specified criteria. Ultimately, they need to be capable of sending clear messages which speak to policy makers and the public at large.

As part of its Green Growth Strategy, the OECD has developed a conceptual framework and indicators that help governments monitor progress towards green growth.

FOCUS: Joint report on Green Growth Indicators, produced under the G8/G7 programme on Green Growth Measurement and Indicators: [Mexico: Towards a Common Approach to Green Growth Indicators](#) (PDF), G8/G7, OECD, UNEP and World Bank (April 2013).

Sample OECD green growth indicators [now online](#)



OECD green growth indicators in practice

Countries like the Czech Republic, Denmark, Germany, Korea, the Netherlands and the Slovak Republic have already applied and adjusted the OECD green growth measurement framework and indicators to their specific national contexts to assess their state of green growth. With the support of OECD, the Latin America Development Bank, the Latin American and the Caribbean Economic System and the United Nations Industrial Development Organization, work is underway in Mexico, Colombia, Costa Rica, Ecuador, Guatemala, Paraguay and Peru to apply the OECD indicators as a way to identify key areas of national concern and the scope for improving the design, choice and performance of policy instruments. Please see here for the [workshop on green growth indicators in Latin American countries](#) which took place in June 2012.




Korea



The Netherlands



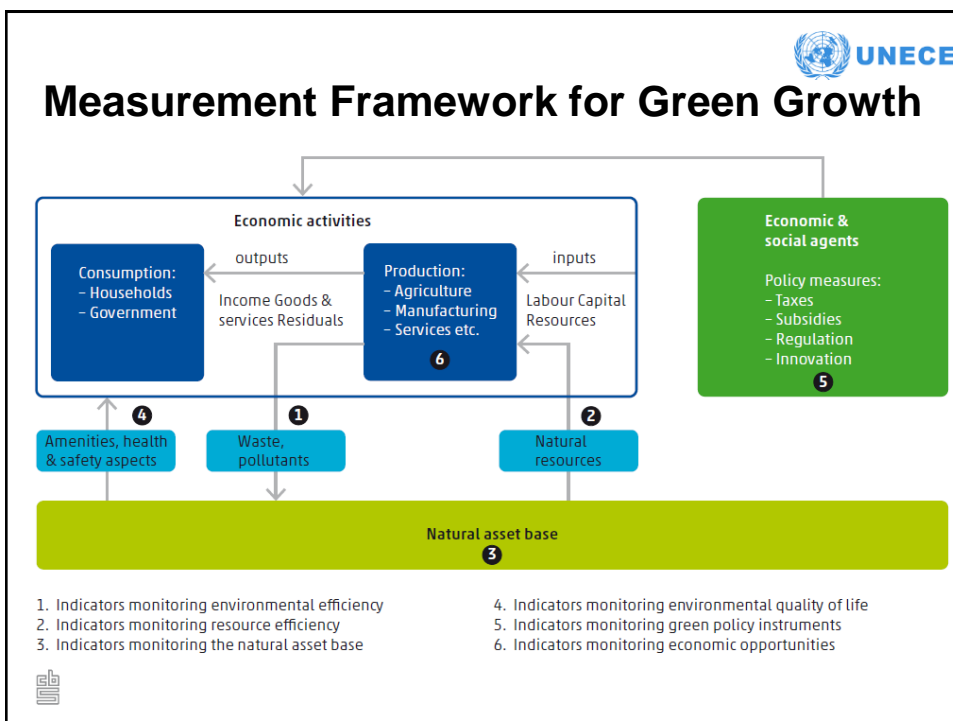
The Czech Republic



Denmark



Germany



SEEA as a data source



| Group | Indicator | Environmental accounts | Environmental and energy statistics | Other |
|-----------------------------------|---|------------------------|-------------------------------------|-------|
| i Environmental Efficiency | Production-based greenhouse gas intensity | X | | |
| | Consumption-based greenhouse gas | X | | |
| | Energy efficiency | X | | |
| | Renewable energy | | X | |
| | Surpluses of nutrients | | X | |
| | Material intensity | X | | |
| | Water use intensity | X | | |
| ii Natural asset base | Waste treatment | X | | |
| | Stocks of standing timber | X | | |
| | Fish inputs | X | | |
| | Natural gas reserves | X | | |
| | Land conversion into built-up land | | X | |
| iii Environmental quality of life | Threats to biodiversity | | X | |
| | Pollution induced health problems | | | X |
| iv Policy responses | Green patents | | | X |
| | Share of green taxes | X | | |
| | Energy prices | X | | |
| | Carbon trade | X | | |
| | Environmental investments | X | | |
| | Green jobs | X | | |




SEEA-CF 2012, FDES 2013, Green Growth



| OECD Green Growth Categories / Potential Indicators | FDES | Related to SEEA-CF |
|---|---|--------------------|
| Environmental Quality of Life | | |
| Urban air quality or exposure to particulates | 1.3.1 Air Quality or 3.1 Emissions to Air | Physical Flows |
| Consider other potential topics such as: | 5.2 Environmental Health | |
| • Health statistics related to air pollution? | 5.1.2 Access to water, sanitation | Physical Flows |
| • Access to clean water, sewage treatment, waste treatment | 3.3.2 Mgmt of waste | |
| • Noise, volume of traffic (proxy for noise) | 1.3.5 Noise | |
| Monitoring economic opportunities and policy responses | | |
| "Core" Environment Industry – ISIC Section E: by 2-digits | 6 Environment Protection, Mgmt & Engagement | Monetary Flow |
| Environmental Taxes (Government Revenue) | 6.2.2 Environmental regulation and instruments | Monetary Flow |
| Government Expenditure (COFOG 05) | 6.1.1 Government Environment protection expenditure | Monetary Flow |

SEEA-CF 2012, FDES 2013, Green Growth

| OECD Green Growth Categories / Potential Indicators |  FDES | Related to SEEA-CF |
|---|--|--------------------|
| Monitoring the Natural Asset Base | | |
| Copper sub-soil assets (reserves – in physical units) | 2.1.1 Stocks and changes of non-energy mineral resources | Asset Accounts |
| Coal sub-soil assets (reserves – in physical units) | 2.2.1 Stocks and changes of mineral energy resources | Asset Accounts |
| Natural Protection Areas – by type of protection | 1.2.3 Biodiversity | |
| Disasters | 4.1 Natural Extreme Events and Disasters | |
| Threatened species | 1.2.2 Ecosystems | |
| Grazing / over-grazing of pasture land | 2.5 Biological Resources | |
| Hunting permits / poaching | 2.5.5 Wild, uncultivated biological resources | |

VII. SEEA 2012 and the SDG Indicators





SDG Indicators and the SEEA

- The Statistical Commission “*recognized SEEA as an important statistical framework for the post-2015 development agenda and the sustainable development goals indicators*” in 2014.
- The SNA and SEEA are statistical standards that can be used to monitor a number of environmental-economic **SDG Indicators in an integrated way.**

SEEA and the Sustainable Development Goals (Status April 2016)



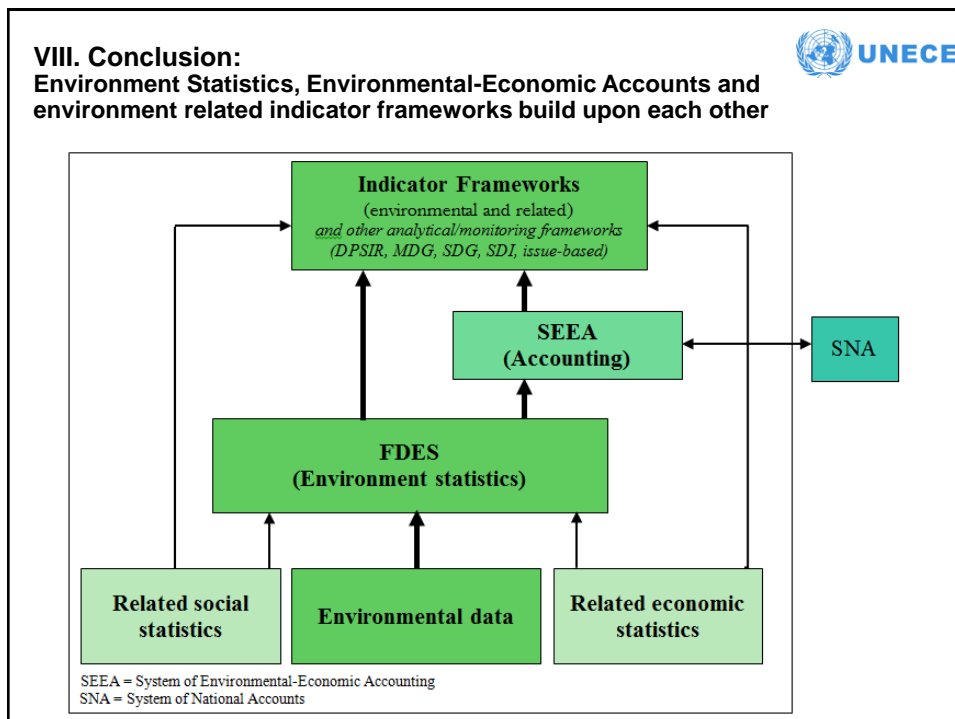
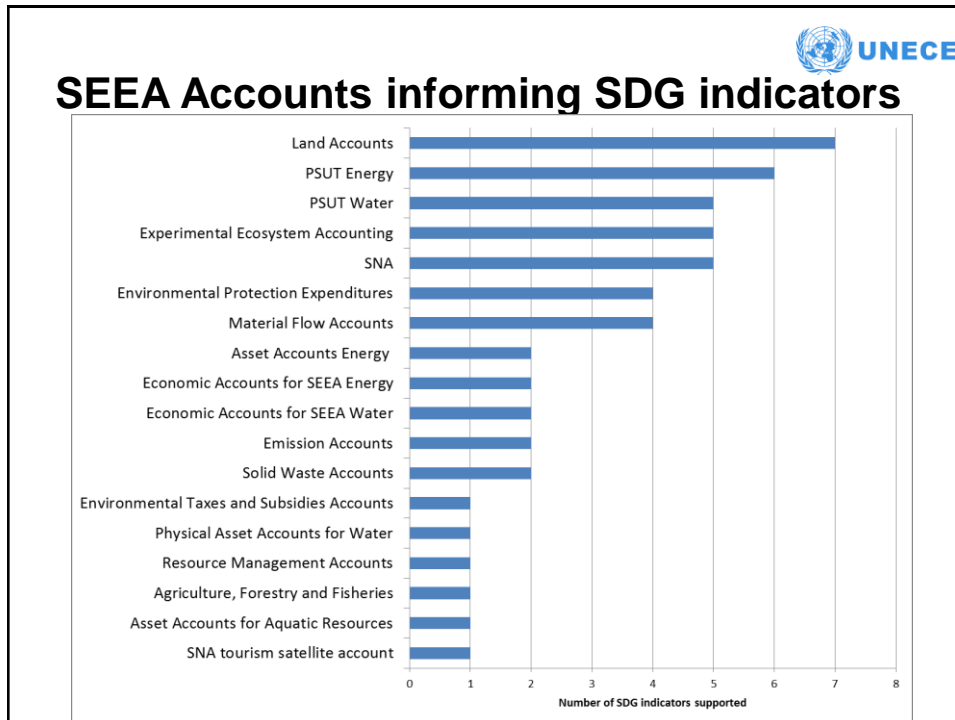
10 (out of 17) SDG goals are directly related to the environmental pillar:

| | |
|-----------------------|---------------------------------|
| 2 - Agriculture | 11 - Cities |
| 6 - Water | 12 - Consumption and production |
| 7 - Energy | 13 - Climate change |
| 8 - Economic growth | 14 - Marine and coastal |
| 9 - Industrialization | 15 - Ecosystems |

42 indicators of these goals can be informed by SEEA

SEEA accounts informing more than 3 SDG indicators are:

- Land Accounts
- Physical supply and use of energy
- Physical supply and use of water
- Experimental Ecosystem Accounts
- Environmental Protection Expenditures
- Material Flow Accounts



Thank you for your attention!

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