Systems of Environmental and Economic Accounting – Central Framework (SEEA-CF): SEEA concepts, definitions and what is needed to get started!

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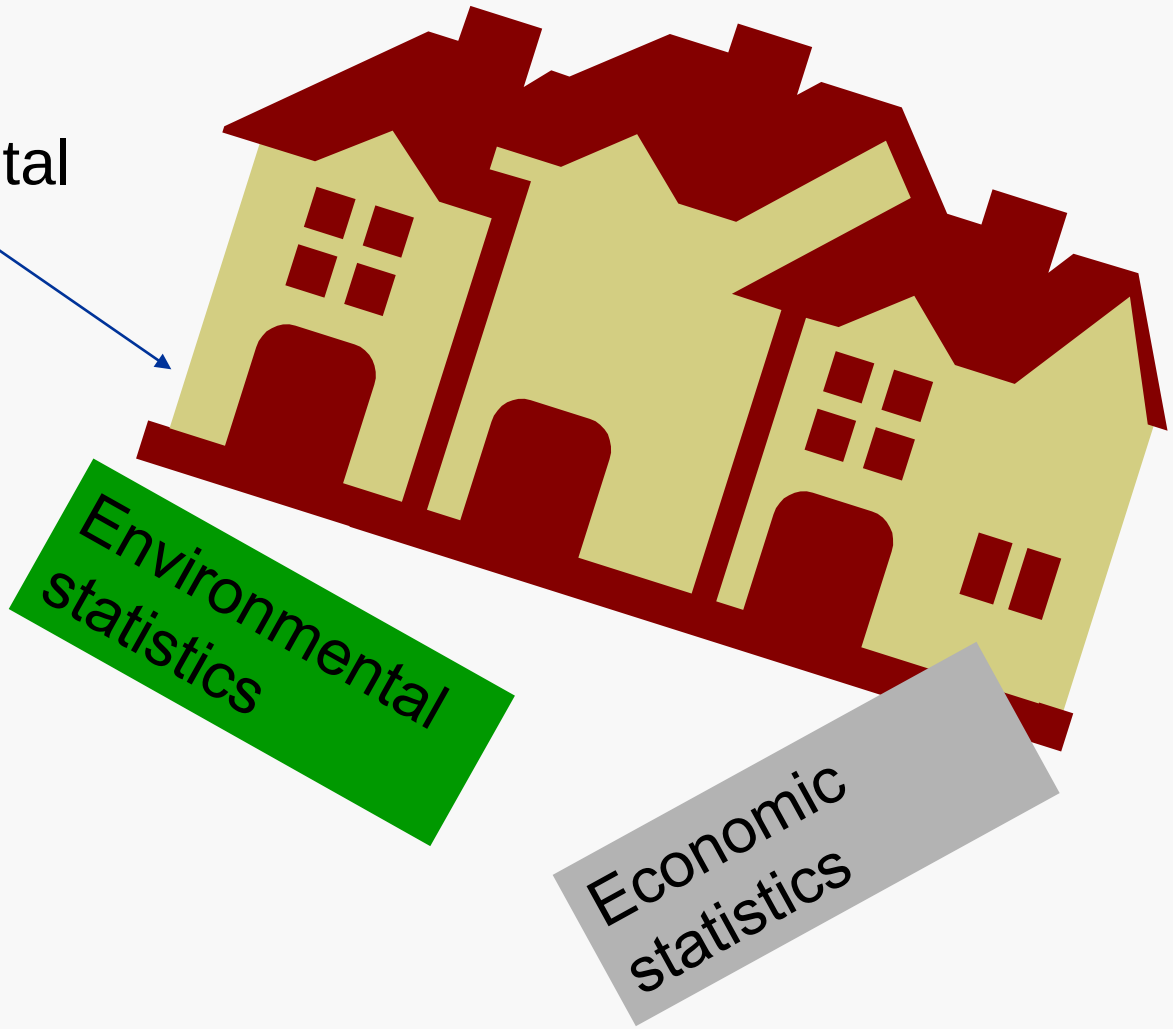
Environmental accounts are built using good statistics, both environmental and economic statistics

Environmental Accounts

Without good statistics, accounts can not be developed

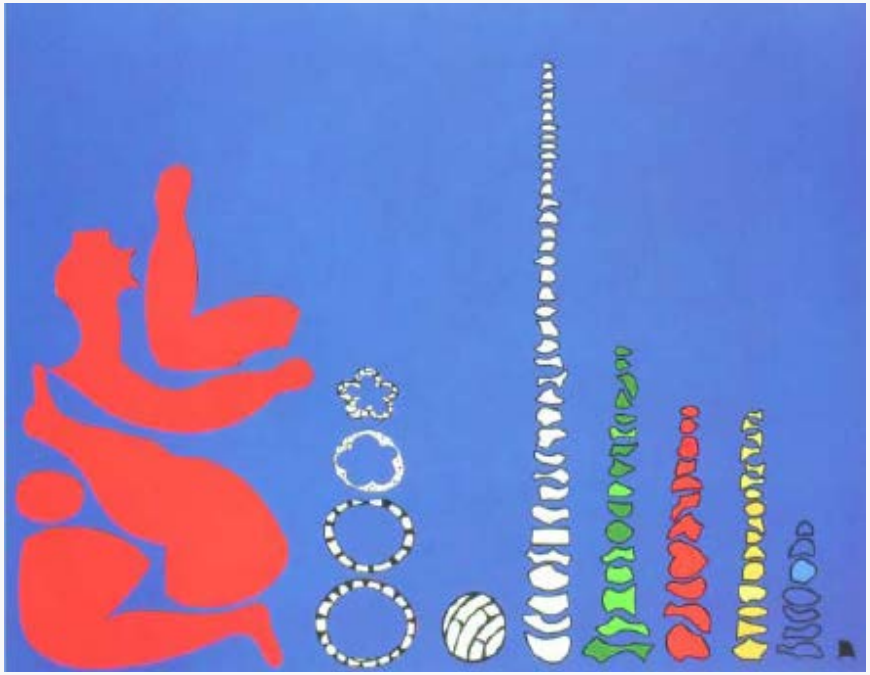
Environmental Accounts



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?

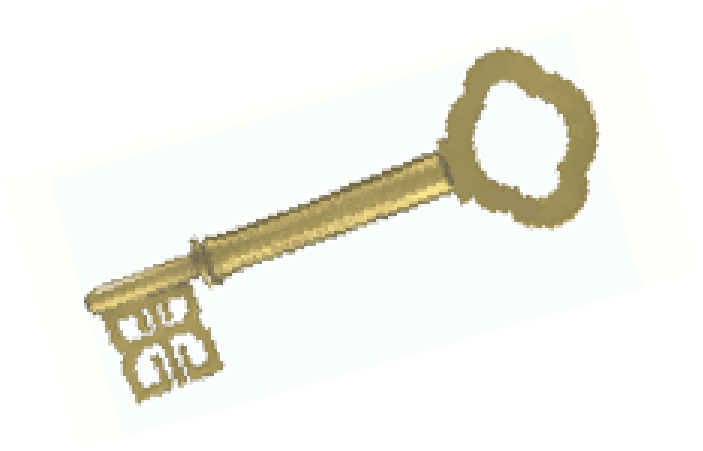
Environmental accounts

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

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

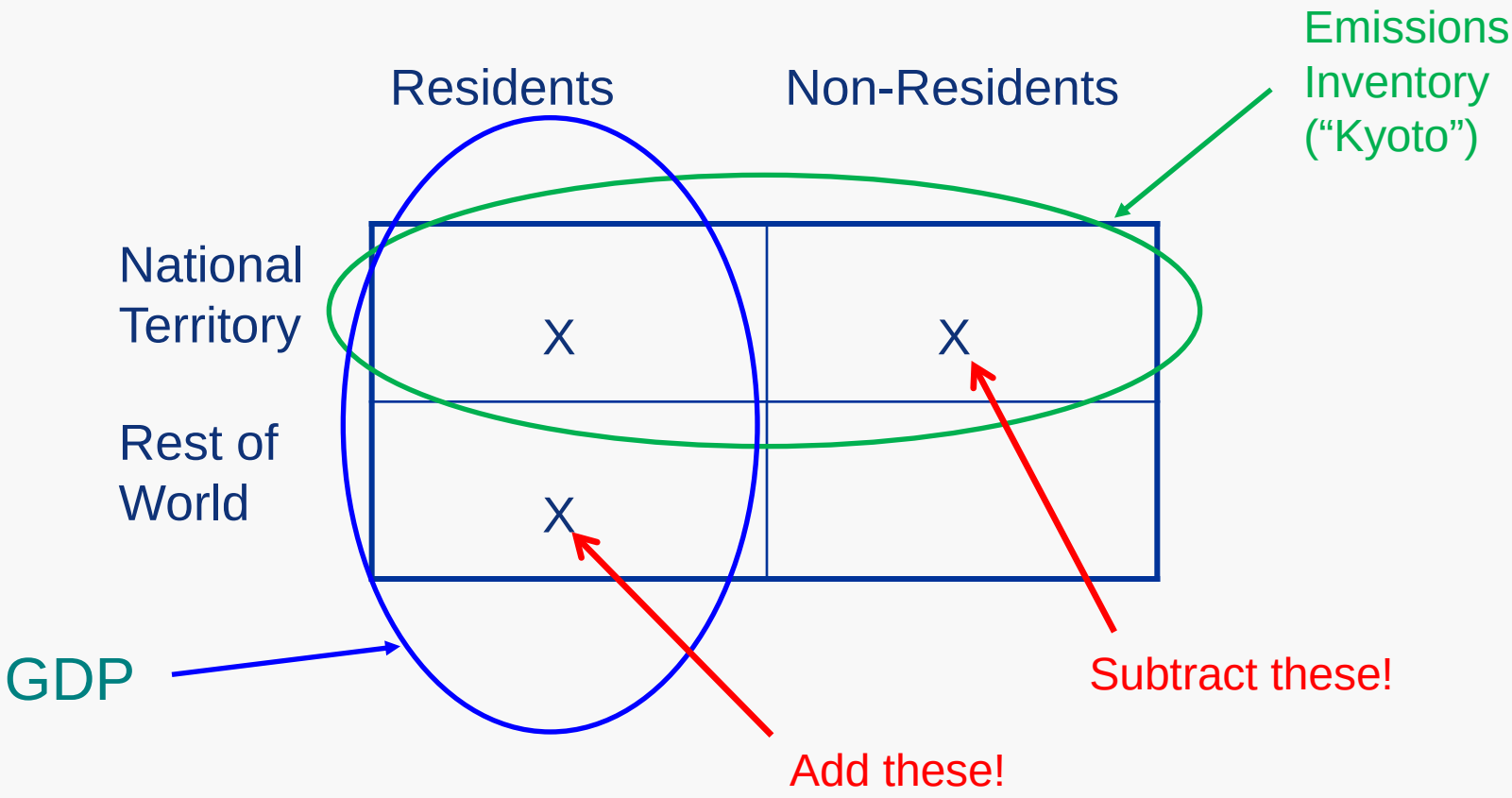
- What is “wrong” or missing from the SNA?
- Values of natural resources not included in the national accounts until they enter the economic system.
- In other words, in the SNA,
  - A tree has no value until it is cut down.
  - GDP increases with environmental accidents since economic activity is stimulated.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

KEY: same classifications!
And same system boundaries



Environmental Accounts
⇔
National Accounts

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 (Kyoto) vs. economic definition (national accounts)

Guidelines & framework: SEEA System of Environmental Economic Accounting

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.)

SEEA extensions and applications: Country examples

SEEA-ecosystems: 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')

SEEA-CF 2012 does NOT go as far as «Green GDP» - only as far as depletion

- SEEA-CF 2012 only goes as far as including depletion of natural resource assets to give depletion adjusted aggregates (see §2.63, Table 2.5, §6.26, Table 6.3, §6.94)

- To get to «Green GDP» one would have to include estimates of environmental damages – but there are no market prices so including things that are different from SNA

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 consump-tion expendi-ture	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 (demand)
Environmental Goods and Services (supply)
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

Potential data sources currently in your systems:

- Industry – ISIC Section E – 2-digit
  - 36 Water collection, treatment and disposal activities
  - 37 Sewerage
  - 38 Waste collection, treatment and disposal activities; materials recovery (ISIC 383)
  - 39 Remediation activities and other waste management services
- Government expenditure – COFOG 05 – 3-digit level:
  - 051 Waste management
  - 052 Wastewater management
  - 053 Pollution abatement
  - 054 Protection of biodiversity and landscape
  - 055 R&D Environment protection
  - 056 Environment protection n.e.c
- Government revenue – Environment related taxes

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

[a] Only applicable for asset accounts in monetary terms.

- Same format for both physical and monetary units
- Start with physical units – can be enough for policy needs
- Convert from physical units to monetary units – using NPV

- Types of natural resource assets:
  - Mineral and energy resources
    Oil, natural gas, coal
    Minerals – metallic and non-metallic
  - Timber resources
  - Aquatic resources

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

Why Asset Accounts?

- Extraction of subsoil assets may create considerable values for a country's society.

  Therefore it is of interest to have appropriate and solid methods to calculate the value of the remaining subsoil asset reserves.

- The purpose of subsoil asset accounts are to capture the economic importance of these natural resources.

- Record stocks and changes in stocks between two time periods, in physical and monetary terms

- Show the contribution of natural capital to national wealth

Two major challenges in subsoil asset accounting:

1. How to measure the level of subsoil stocks in physical terms

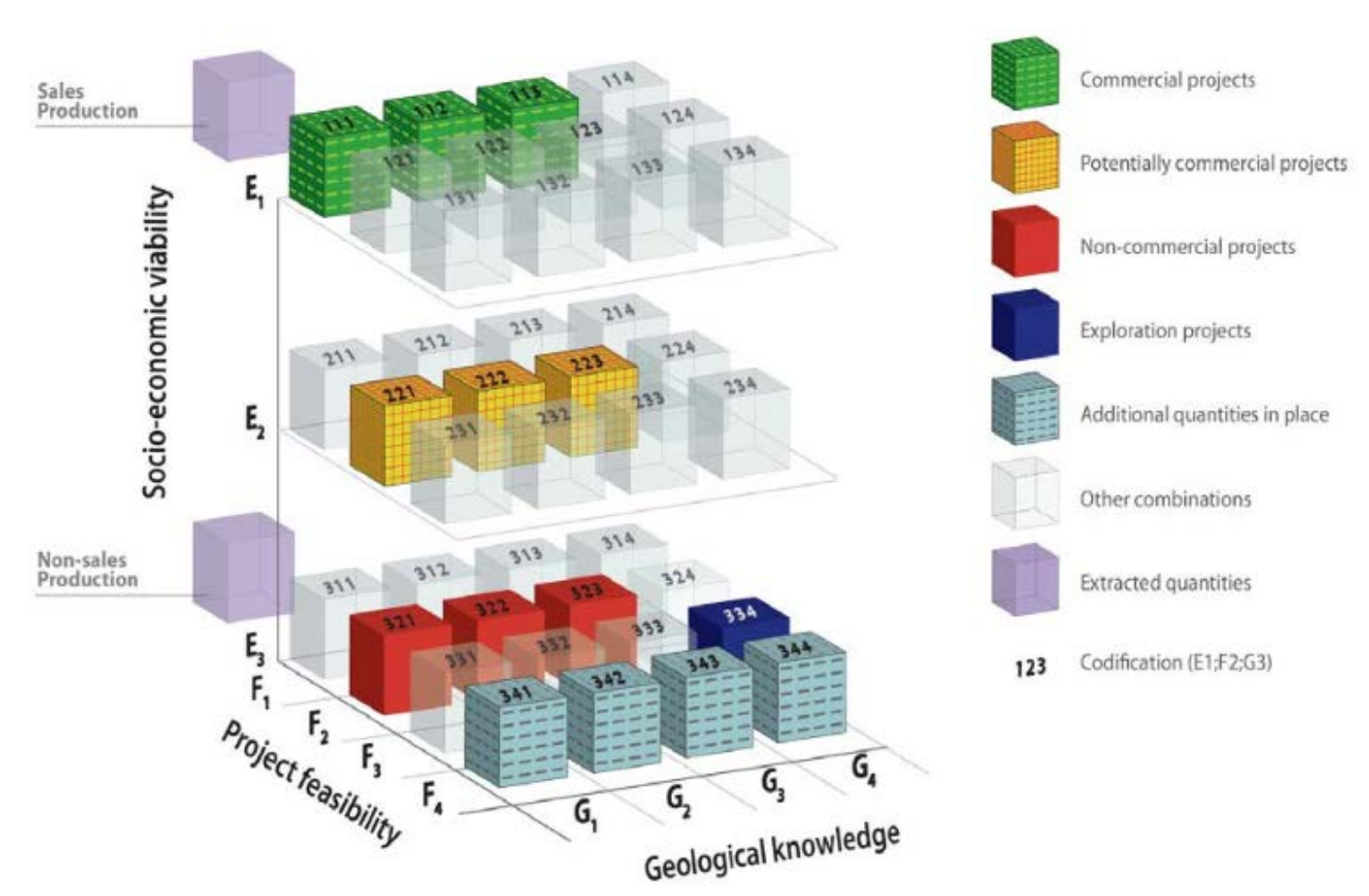
2. How to place value on these

Physical asset accounts - sources and classifications in use

- National classification systems for subsoil assets are widespread, but most countries use some kind of McKelvey-box principle as basis for their classification. SEEA: Use UNFC.

- Estimates of the subsoil assets deposits in physical terms are normally made by other organisations than the statistical bureaus, like the oil and gas directorate or Ministry of Mines

UN-classification system of Fossil Energy and Mineral Reserves and Resources



http://www.unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/pub/UNFC2009_Spec_ES42.pdf

Changing physical units to monetary units

- Using an indirect valuation method
  → SEEA recommends to calculate the monetary value of the oil and gas resources as the present value of the expected future net resource rent from oil and gas.

- What will the future prices be?
  Recommends to use a constant unit rent per unit extracted..

- What is the appropriate discount rate to be applied to the earnings in the future years?

- What will the future extraction levels be?
  Eurostat recommends to use explicit forecasts!
  - but difficult to get
  - estimate is based on a constant level of extraction (same as current year's extraction)

Assumptions make a BÌG difference! Sensitivity analysis

- The valuation of the oil and gas resources is highly dependent on
  - forecast of **future prices** & **extraction levels**
  - the choice of the **discount rate** and
  - the assumptions made in relation to the **normal rate of return to fixed capital**

Changing the assumptions for Norway (2001)

	Oil (and NGL)				Natural Gas			
	Unit rent (mill NOK)				Unit rent (mill NOK)			
	3-year moving average			Current year	3-year moving average			Current year
	Rate of return			Rate of return	Rate of return			Rate of return
Dis-count rate	6 %	8 %	10 %	8 %	6 %	8 %	10 %	8 %
0 %	3 837 564	3 642 625	3 447 687	3 572 506	3 887 416	3 688 484	3 489 551	4 297 258
4 %	2 528 884	2 400 423	2 271 962	2 354 215	804 618	764 443	722 268	889 447
8%	1 788 942	1 698 068	1 607 195	1 665 381	405 984	385 208	364 433	448 786

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 = *N*ational *A*ccounting *M*atrix including *E*nvironmental *A*ccounts

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

Environmental accounts are built using good statistics, both environmental and economic statistics

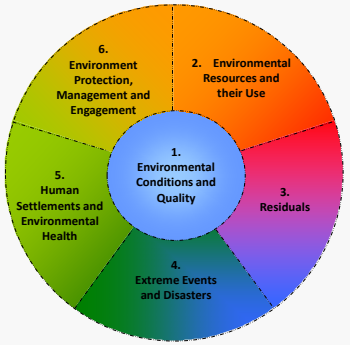
Environmental Accounts

Building blocks

Environmental statistics

Economic statistics

Framework for the Development of Environment statistics (FDES 2013)?



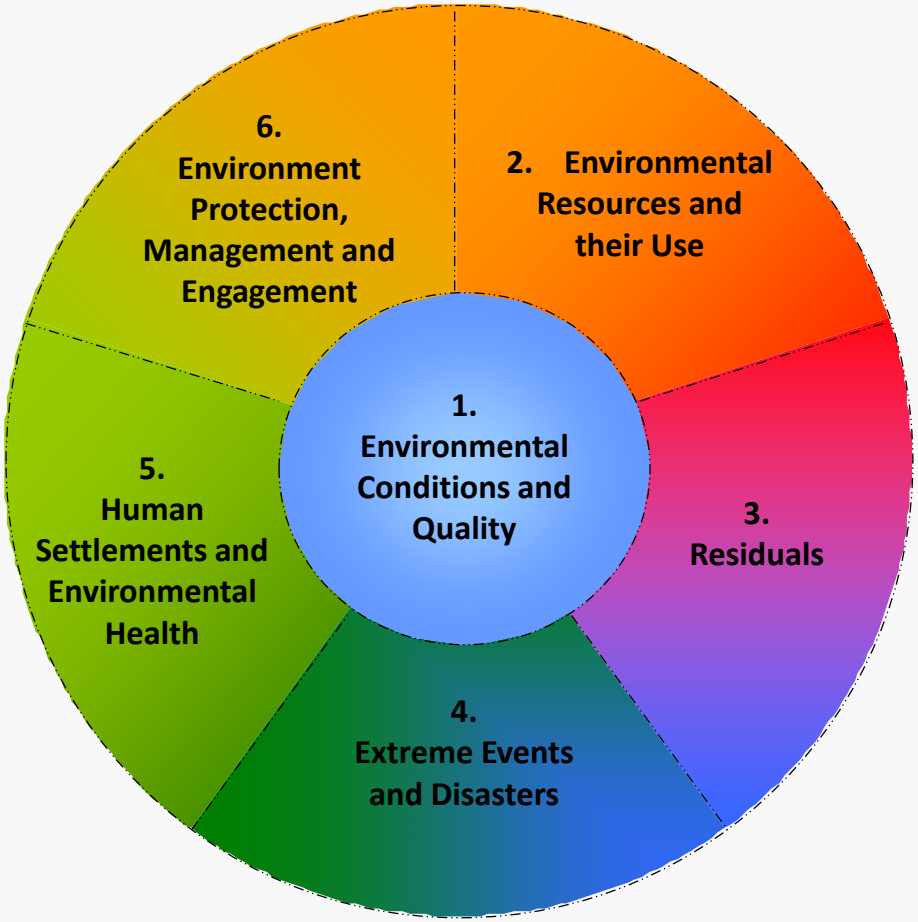
Scope of the FDES

Covers biophysical aspects of the environment and those aspects of the human sub-system that directly influence and interact with the state and quality of the environment.

Objective of the FDES

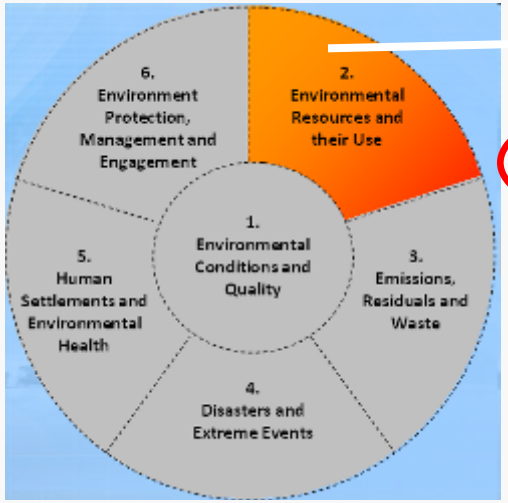
- Primarily to guide countries at early stages in the development of their environment statistics programmes.
- Also applicable to countries in general, and at the regional and global levels.

FDES 2013 structure



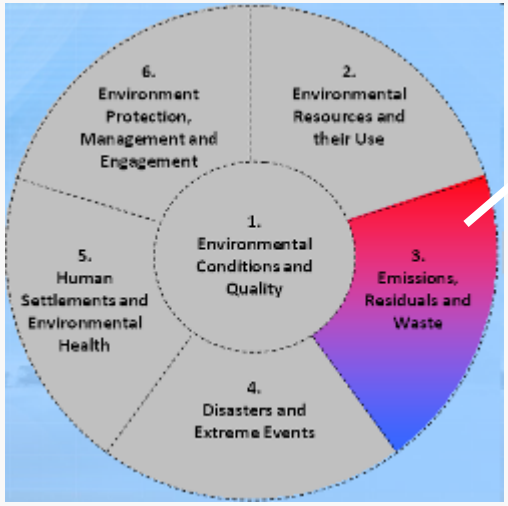
- Six components
- At the centre of the FDES: Environmental conditions and quality
- All of the components relate to each other
- Multi-layered (component, sub-component, topic, individual statistics)
- Flexible
- Adaptable

Asset Accounts



Component 2: Environmental Resources and their Use	Sub-component 2.1: Non-energy Mineral Resources Sub-component 2.2: Energy Resources Sub-component 2.3: Land Sub-component 2.4: Soil Resources Sub-component 2.5: Biological Resources Sub-component 2.6: Water Resources

Flow Accounts



Component 3: Residuals	Sub-component 3.1: Emissions to Air Sub-component 3.2: Generation and Management of Wastewater Sub-component 3.3: Generation and Management of Waste

Component 6: Environment Protection, Management and Engagement	Sub-component 6.1: Environment Protection and Resource Management Expenditure Sub-component 6.2: Environmental Governance and Regulation Sub-Component 6.3: Extreme Event Preparedness and Disaster Management Sub-component 6.4: Environmental Information and Awareness

Environmental accounts are built using good statistics, both environmental and economic statistics

Environmental Accounts

Building blocks

Economic Statistics – SNA

- Supply and Use tables (product x industry)
- Input – Output tables (industry x industry)

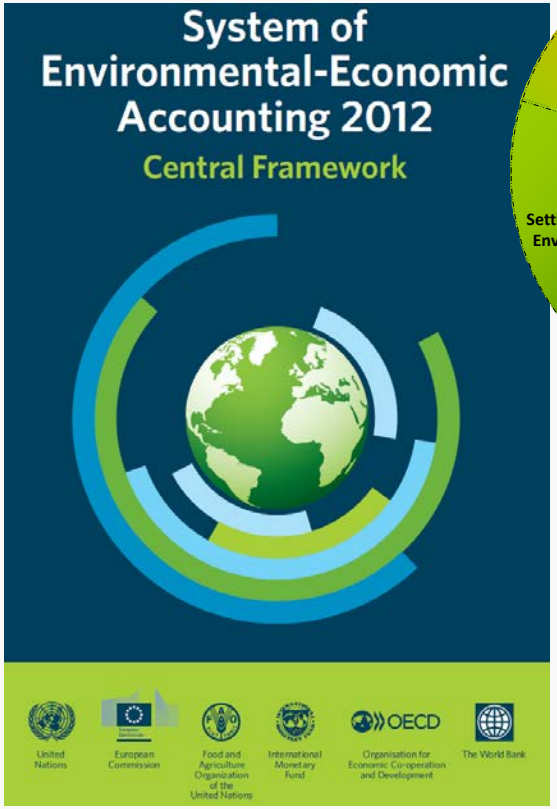
- For functional accounts – economic activity flow accounts: To find the «environment» component in the national accounts…
  - Need detailed products!
  - Need detailed industries!
  - Need detailed functional accounts (COFOG)

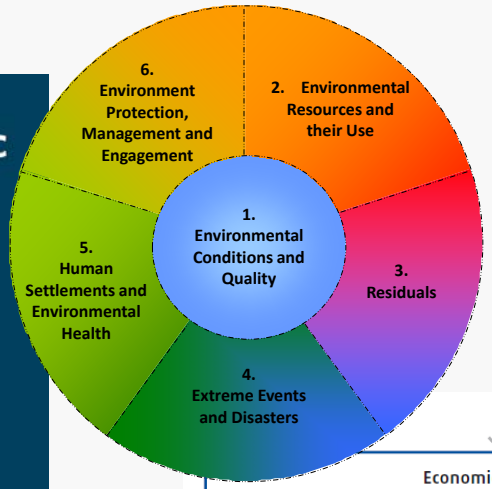
Keep in mind…

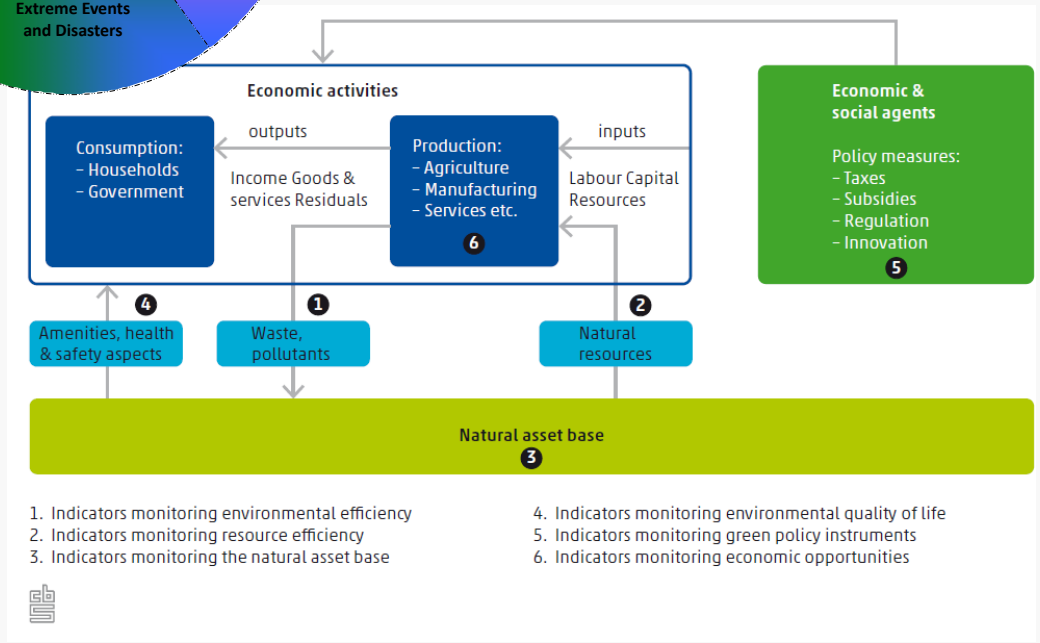
- Multi-purpose data collection – report figures once and use them many times – SEEA-CF uses existing data – if possible!
- Keep the detail in the data systems
- Keep industry classifications connected to the data collected
- Keep product classifications connected to the data collected
- Develop national accounts with as much detail as possible

- Implement the SEEA-CF modules that are useful / important based on the characteristics and needs of your country

SEEA-CF 2012; FDES 2013; Green Growth
Implement in isolation or coordination?







OECD: Green Growth Indicators

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

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Green growth and sustainable development

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- 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

Green growth indicators

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.

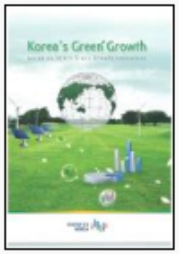
As part of its Green Growth Strategy, the OECD has developed a conceptual framework and indicators that help governments monitor progress towards green growth.

FOCUS: Joint report on Green Growth Indicators, produced under the GGKP programme on Green Growth Measurement and Indicators: Moving Towards a Common Approach on Green Growth Indicators (PDF), GGGI, OECD, UNEP and World Bank (April 2013).

Sample OECD green growth indicators now online.

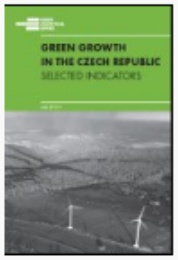
OECD green growth indicators in practice

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.



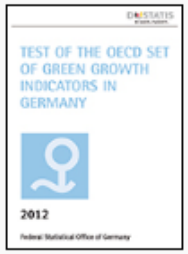
Korea

The Netherlands



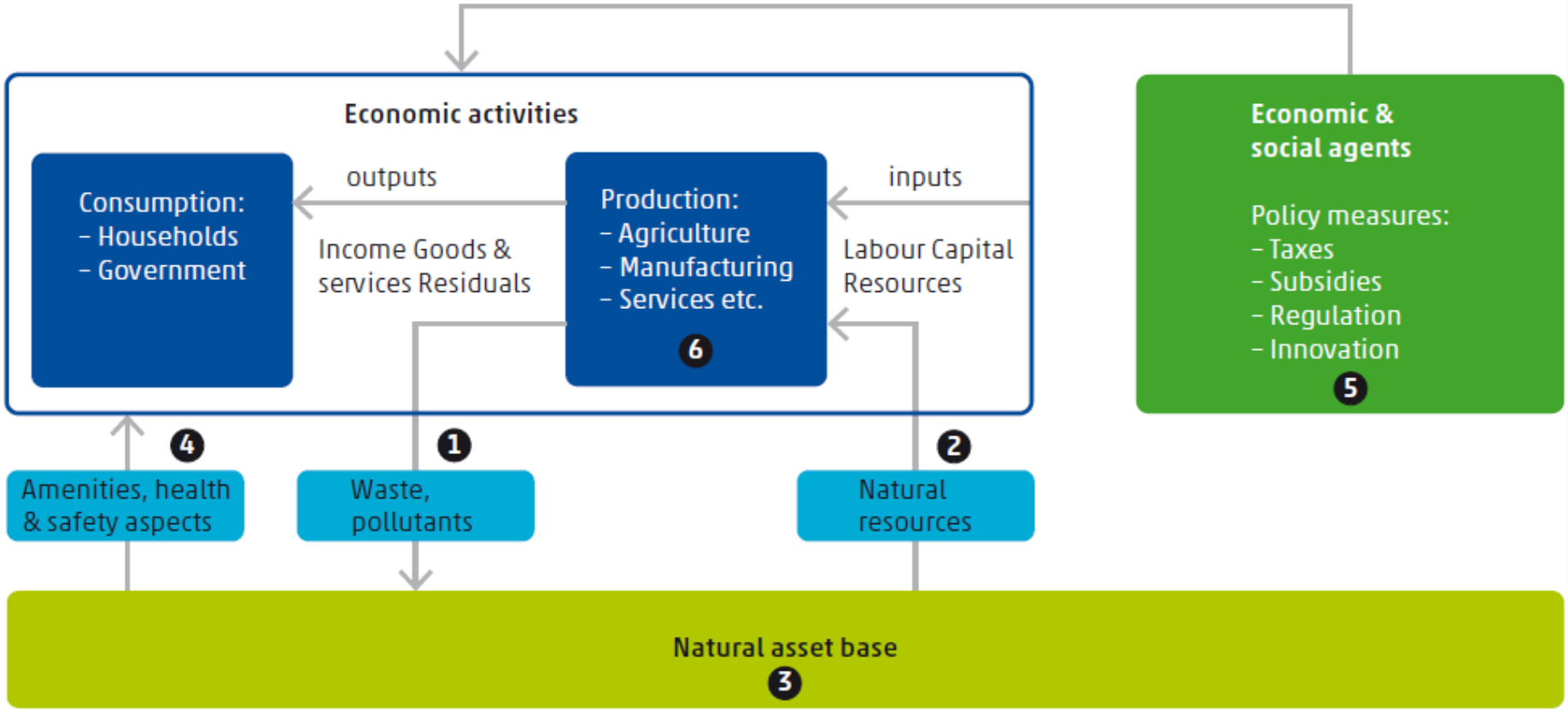
The Czech Republic

Denmark



Germany

Measurement Framework for Green Growth



1. Indicators monitoring environmental efficiency
2. Indicators monitoring resource efficiency
3. Indicators monitoring the natural asset base
4. Indicators monitoring environmental quality of life
5. Indicators monitoring green policy instruments
6. Indicators monitoring economic opportunities

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		
		Waste treatment	X		
ii	Natural asset base	Stocks of standing timber	X		
		Fish inputs	X		
		Natural gas reserves	X		
		Land conversion into built-up land		X	
		Threats to biodiversity		X	
iii	Environmental quality of life	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 (Proposal for Mongolia)

OECD Green Growth Categories / Potential Indicators	FDES	Related to SEEA-CF
Environmental and Resource Efficiency		
Waste generation	3.3.2 Management of waste	Physical flow
Waste Recycling	3.3.2 Management of waste	Physical flow
EW-MFA: Domestic Material Consumption per GDP or per capita	2 Environmental Resources & their Use	Physical flow
Net Domestic Energy Use	2.2.2 Production and consumption of energy	Physical flow

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: • **Health statistics related to air pollution?** • **Access to clean water, sewage treatment, waste treatment** • **Noise, volume of traffic (proxy for noise)**	5.2 Environmental Health 5.1.2 Access to water, sanitation 3.3.2 Mgmt of waste 1.3.5 Noise	Physical Flows
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	

Where to start?

- Request by the UNCEEA: Global assessment in two phases

- Phase 1 – General overview

Part A: environment statistics

Part B: environmental-economic accounting

- Phase 2 – Detailed follow-up on each of the following issues

Energy Statistics and Balances

Water Statistics and Accounts

Energy Accounts

Air emission statistics and accounts (soon to be dispatched)

Questionnaires online:

http://unstats.un.org/unsd/envaccounting/assessment.asp

Also available: Self-assessment tool for FDES

Thank you for your attention!

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