Main concepts used in environment statistics (UN Framework for the development of Environment Statistics, FDES) and the System of Environmental-Economic Accounting (SEEA)

How they support user’s needs

Michael Nagy, UNECE
What are the main information needs?
Informing different policy perspectives

Improving access to services and resources
Managing supply and demand

Improving the state of environment and reducing impacts
Mitigating risks and adapting to extreme events
What are the main information needs?
Informing different policy and indicator frameworks
Why do we need environment statistics AND environmental-economic accounts?

Integrating environmental and economic information

Environmental-Economic Indicators
(e.g. CO$_2$ emissions/value added)

Environmental Indicators
(e.g. CO$_2$ emissions/capita/year)

Environmental Statistics
(Water, Air Emissions, Waste, Soil, Air Quality,...)

Economic Indicators
(e.g. GDP, value added etc.)

Economic Statistics and National Accounts
(National Accounts, Trade Statistics, etc.)

Integration
(e.g. Environmental-Economic Accounts)

Municipal Survey
Administrative records
Etc.

Enterprise surveys
Administrative records
Etc.
**A note on Frameworks**

**FDES and SEEA ideally are used together**

**FDES is an *organising* framework**
- Based on Pressure-State-Response
- Good for compiling basic statistics and reporting
- Covers most issues of concern
- **BUT:** May risk viewing all human activities as “pressures”

**SEEA is an *accounting* framework**
- Integrates related statistics into “accounts” (e.g. water, energy, land, ecosystems)
- Links to SNA by using same classifications and methods
- Good for compiling integrated indicators (e.g. water intensity of economy) to assess trade-offs
- **BUT:** covers limited set of issues & less experience

Source: Michael Bordt (UNESCAP)
Why environment statistics?
A single trusted source for multiple purposes

- Improve knowledge
- Support evidence-based policy
- Provide information to the general public, media and other user groups
Guide the formulation of environment statistics programmes by

- Delineating the scope of environment statistics and identifying its constituents
- Contributing to the assessment of data requirements, sources, availability and gaps
- Guiding the development of multipurpose data collection processes and databases
- Assisting in the coordination and organisation of environment statistics
Conceptual foundation of the FDES 2013

Environmental conditions, impacts and related human activities

Environment, Human Sub-system and Interactions

Environmental conditions and their changes

- Environment
- Human Sub-system
- Interactions between the environment and the human sub-system

- Natural Processes
- Human Activities
- Impacts from the Changing Environment

Processes within the environment
Processes within the human sub-system
Changes over time
Scope and structure of the FDES 2013
Biophysical aspects, related human sub-system, impacts and interactions

1. Environmental Conditions and Quality
2. Environmental Resources and their Use
3. Residuals
4. Extreme Events and Disasters
5. Human Settlements and Environmental Health
A multi-level approach of the FDES

<table>
<thead>
<tr>
<th>Component 1: Environmental Conditions and Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 1.1: Physical Conditions</td>
</tr>
<tr>
<td>Sub-component 1.2: Land Cover, Ecosystems and Biodiversity</td>
</tr>
<tr>
<td>Sub-component 1.3: Environmental Quality</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component 2: Environmental Resources and their Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 2.1: Mineral Resources</td>
</tr>
<tr>
<td>Sub-component 2.2: Energy Resources</td>
</tr>
<tr>
<td>Sub-component 2.3: Land</td>
</tr>
<tr>
<td>Sub-component 2.4: Soil Resources</td>
</tr>
<tr>
<td>Sub-component 2.5: Biological Resources</td>
</tr>
<tr>
<td>Sub-component 2.6: Water Resources</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component 3: Residuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 3.1: Emissions to Air</td>
</tr>
<tr>
<td>Sub-component 3.2: Generation and Management of Wastewater</td>
</tr>
<tr>
<td>Sub-component 3.3: Generation and Management of Waste</td>
</tr>
<tr>
<td>Sub-component 3.4: Release of Chemical Substances</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component 4: Extreme Events and Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 4.1: Natural Extreme Events and Disasters</td>
</tr>
<tr>
<td>Sub-component 4.2: Technological Disasters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component 5: Human Settlements and Environmental Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 5.1: Human Settlements</td>
</tr>
<tr>
<td>Sub-component 5.2: Environmental Health</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component 6: Environmental Protection, Management and Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-component 6.1: Environmental Protection and Resource Management Expenditure</td>
</tr>
<tr>
<td>Sub-component 6.2: Environmental Governance and Regulation</td>
</tr>
<tr>
<td>Sub-component 6.3: Extreme Event Preparedness and Disaster Management</td>
</tr>
<tr>
<td>Sub-component 6.4: Environmental Information and Awareness</td>
</tr>
</tbody>
</table>

Levels of the FDES

<table>
<thead>
<tr>
<th>Component</th>
<th>Sub-component</th>
<th>Statistical Topic</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 digit</td>
<td>2 digits</td>
<td>3 digits</td>
<td>4 or 5 digits</td>
</tr>
</tbody>
</table>

Example of Basic Set of Environment Statistics

### Component 1: Environmental Conditions and Quality

#### Sub-component 1.3: Environmental Quality

**Topic 1.3.1: Air quality**

- **Environmental quality**
  - Local air quality
    - Concentration level of particulate matter (PM$_{10}$)
    - Concentration level of particulate matter (PM$_{2.5}$)
    - Concentration level of tropospheric ozone (O$_3$)
    - Concentration level of carbon monoxide (CO)
    - Concentration level of sulfur dioxide (SO$_2$)
    - Concentration levels of nitrogen oxides (NO$_x$)
    - Concentration levels of heavy metals
    - Concentration levels of non-methane volatile organic compounds (NMVOCs)
    - Concentration levels of dioxins
    - Concentration levels of furans
    - Concentration levels of other pollutants
  - Global atmospheric concentrations of greenhouse gases
    - Global atmospheric concentration levels of carbon dioxide (CO$_2$)
    - Global atmospheric concentration levels of methane (CH$_4$)

### Flexibility and adaptability: prioritizing components, sub-components and topics

### Flexibility and adaptability: tiers

Environment Statistics Section, United Nations Statistics Division
Applications of the FDES to cross-cutting issues (Chapter 5 of FDES 2013)

- The FDES can be applied to inform about cross-cutting policy issues important to countries at any given time.

- Examples:
  - Water and the environment
  - Energy and the environment
  - Climate change
  - Agriculture and the environment
Climate change statistics

Note: Also applicable for the CES Recommendations on CC-related Statistics.
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.
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

Why make environmental accounts?
Aren’t environmental statistics enough?
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
Use of the SNA principles

Statistics

Stocks and flows in physical and monetary terms

Accounts

Source: United Nations Statistics Division
SEEA is considered as an underlying framework by international initiatives

It is a multi-purpose accounting framework

- Monitoring Sustainable Development Goals
- OECD: Towards Green Growth
- European Union: Beyond GDP
- Conference of European Statisticians: Set of core Climate Change related Indicators
- World Bank: Wealth Accounting and the Valuation of Ecosystem Services (WAVES)
- Etc.
SEEA Central Framework
International statistical standard since 2012

- 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
Main concepts of environmental-economic accounting

Similar to FDES, but following accounting principles

- **Economy**
  - Industries
  - Households
  - Government
  - **Products** (goods and services produced and consumed in the economy)

- **Environment**
  - **Natural inputs** (including mineral resources, timber resources, aquatic resources and water resources)
  - **Residuals** (including air emissions and return flows of water)
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

<table>
<thead>
<tr>
<th></th>
<th>Residents</th>
<th>Non-Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Territory</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rest of World</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>GDP</td>
<td>Add these!</td>
<td>Subtract these!</td>
</tr>
</tbody>
</table>

e.g. Emissions Inventory
Need to make the environmental statistics 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)
a) SEEA Central Framework (SEEA-CF):
• 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

All available on https://seea.un.org/
Main take home message

Environment Statistics, Environmental-Economic Accounts and environment related indicator frameworks build upon each other’
I. The links between SEEA 2012 and FDES 2013
II. Linking SEEA-CF 2012 / FDES 2013 / Green Growth
III. SEEA 2012 and the SDG Indicators
IV. Experimental Ecosystem Accounting
V. Examples
Thank you!

Michael Nagy
UNECE
Annex I: The links between SEEA 2012 and FDES 2013
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

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 |
Annex II: SEEA-CF 2012 / FDES 2013 / Green Growth
Implement in coordination!
OECD: Green Growth Indicators

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

Green growth and sustainable development

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 GGGIP programme on Green Growth Measurement and Indicators: Moving Towards a Common Approach on Green Growth Indicators (PDF, 440Kb, OECD, UNEP and World Bank (April 2013))

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.

Sample OECD green growth indicators new outing.

Korea  The Netherlands  The Czech Republic  Denmark  Germany
Measurement Framework for Green Growth

Economic activities

Consumption:
- Households
- Government

Production:
- Agriculture
- Manufacturing
- Services etc.

Economic & social agents

Policy measures:
- Taxes
- Subsidies
- Regulation
- Innovation

Natural asset base

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

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

<table>
<thead>
<tr>
<th>Environmental Quality of Life</th>
<th>FDES</th>
<th>Related to SEEA-CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban air quality or exposure to particulates</td>
<td>1.3.1 Air Quality or 3.1 Emissions to Air</td>
<td>Physical Flows</td>
</tr>
<tr>
<td>Consider other potential topics such as:</td>
<td>5.2 Environmental Health 5.1.2 Access to water, sanitation 3.3.2 Mgmt of waste 1.3.5 Noise</td>
<td>Physical Flows</td>
</tr>
<tr>
<td>• Health statistics related to air pollution?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Access to clean water, sewage treatment, waste treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Noise, volume of traffic (proxy for noise)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitoring economic opportunities and policy responses</th>
<th>FDES</th>
<th>Related to SEEA-CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Core” Environment Industry – ISIC Section E: by 2-digits</td>
<td>6 Environment Protection, Mgmt &amp; Engagement</td>
<td>Monetary Flow</td>
</tr>
<tr>
<td>Environmental Taxes (Government Revenue)</td>
<td>6.2.2 Environmental regulation and instruments</td>
<td>Monetary Flow</td>
</tr>
<tr>
<td>Government Expenditure (COFOG 05)</td>
<td>6.1.1 Government Environment protection expenditure</td>
<td>Monetary Flow</td>
</tr>
</tbody>
</table>
## OECD Green Growth Categories / Potential Indicators

<table>
<thead>
<tr>
<th>Monitoring the Natural Asset Base</th>
<th>FDES</th>
<th>Related to SEEA-CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sub-soil assets (reserves – in physical units)</td>
<td>2.1.1 Stocks and changes of non-energy mineral resources</td>
<td>Asset Accounts</td>
</tr>
<tr>
<td>Coal sub-soil assets (reserves – in physical units)</td>
<td>2.2.1 Stocks and changes of mineral energy resources</td>
<td>Asset Accounts</td>
</tr>
<tr>
<td>Natural Protection Areas – by type of protection</td>
<td>1.2.3 Biodiversity</td>
<td></td>
</tr>
<tr>
<td>Disasters</td>
<td>4.1 Natural Extreme Events and Disasters</td>
<td></td>
</tr>
<tr>
<td>Threatened species</td>
<td>1.2.2 Ecosystems</td>
<td></td>
</tr>
<tr>
<td>Grazing / over-grazing of pasture land</td>
<td>2.5 Biological Resources</td>
<td></td>
</tr>
<tr>
<td>Hunting permits / poaching</td>
<td>2.5.5 Wild, uncultivated biological resources</td>
<td></td>
</tr>
</tbody>
</table>
Annex III: 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
- 6 - Water
- 7 – Energy
- 8 – Economic growth
- 9 – Industrialization
- 11 - Cities
- 12 - Consumption and production
- 13 - Climate change
- 14 - Marine and coastal
- 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
SEEA Accounts informing SDG

- Land Accounts
- PSUT Energy
- PSUT Water
- Experimental Ecosystem Accounting
- SNA
- Environmental Protection Expenditures
- Material Flow Accounts
- Asset Accounts Energy
- Economic Accounts for SEEA Energy
- Economic Accounts for SEEA Water
- Emission Accounts
- Solid Waste Accounts
- Environmental Taxes and Subsidies Accounts
- Physical Asset Accounts for Water
- Resource Management Accounts
- Agriculture, Forestry and Fisheries
- Asset Accounts for Aquatic Resources
- SNA tourism satellite account

Number of SDG indicators supported
Annex IV: 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)
Annex V: Examples
Example Norway (1/2): «Profile» with output and GHG emissions by industry – who contributes the most

Figure 3. Greenhouse gas emissions (CO\textsubscript{2}-equivalents) and output (fixed 2005-prices) divided according to industries and share of totals. 2012

- Agriculture, forestry and fishing
- Oil and gas extraction
- Manufacturing
- Energy and water supply, sewage and waste management
- Transport incl. ocean transport and international air transport
- Services and remaining industries not elsewhere included\(^1\)

\(^1\) 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

![Graph showing effects causing changes in greenhouse gas emissions (decomposition) between 2011 and 2012.](image)

Source: Statistics Norway.
Example Australia: Monetary versus physical use of distributed water (% of total use)
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%.

<table>
<thead>
<tr>
<th></th>
<th>Increase in GDP, A$million</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1% increase WUE</td>
</tr>
<tr>
<td>Irrigated agriculture</td>
<td>-24</td>
</tr>
<tr>
<td>Dryland agriculture</td>
<td>-51</td>
</tr>
<tr>
<td>Food and fibre processing</td>
<td>44</td>
</tr>
<tr>
<td>Other industries</td>
<td>262</td>
</tr>
<tr>
<td>Total impact on GDP</td>
<td>253</td>
</tr>
</tbody>
</table>
Netherlands: Measuring green growth

Objective:

• Assess the state of green growth in the Netherlands
• Benchmark for a more thorough and comprehensive assessment 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
<table>
<thead>
<tr>
<th>LCEU</th>
<th>Crop production</th>
<th>Fodder production</th>
<th>Drinking water extraction</th>
<th>Hunting</th>
<th>Air quality regulation</th>
<th>Forest carbon sequestration</th>
<th>Recreational cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Mean (SD)</td>
<td>Total</td>
<td>Mean (SD)</td>
<td>Total</td>
<td>Mean (SD)</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Mttons MEQ</td>
<td>kg MEQ ha(^{-1}) yr(^{-1})</td>
<td>kt tons dm</td>
<td>kg dm ha(^{-1}) yr(^{-1})</td>
<td>10(^{3}) m(^{3}) water</td>
<td>kg meat ha(^{-1}) yr(^{-1})</td>
<td>kg meat km(^{2}) yr(^{-1})</td>
</tr>
<tr>
<td>Pasture</td>
<td>-</td>
<td>-</td>
<td>521</td>
<td>12,041 (1,573)</td>
<td>9,110</td>
<td>3,099 (2,231)</td>
<td>9,100</td>
</tr>
<tr>
<td>Cropland</td>
<td>2.46</td>
<td>36,314 (1,785)</td>
<td>-</td>
<td>-</td>
<td>14,855</td>
<td>3,082 (2,422)</td>
<td>14,732</td>
</tr>
<tr>
<td>Forest</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4,577</td>
<td>3,214 (2,624)</td>
<td>8,100</td>
</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,289</td>
<td>9,460 (3,698)</td>
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<td>Urban</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7,862</td>
<td>4,321 (3,527)</td>
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<tr>
<td>Heath</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>219</td>
<td>1,293 (821)</td>
<td>678</td>
</tr>
<tr>
<td>Peat</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0 (0)</td>
<td>70</td>
</tr>
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<td>Other nature</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,187</td>
<td>3,093 (2,567)</td>
<td>1,513</td>
</tr>
<tr>
<td>Provincial total</td>
<td>2.46</td>
<td>521</td>
<td>41,099</td>
<td>34,193</td>
<td>2,252</td>
<td>55</td>
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