# Ecosystem accounts Limburg

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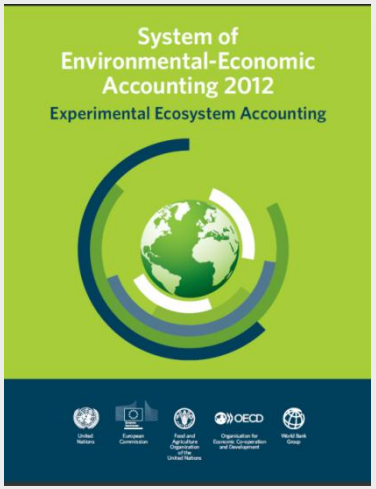
# Context

SEEA EEA (2012) and SEEA EEA Technical Recommendations (*forthcoming*): accounting based on the concept of Ecosystem Services




- Identify suppliers and beneficiaries of ecosystem services
- Identify causes for change/degradation
- Determine costs/benefits

# Project aims and products

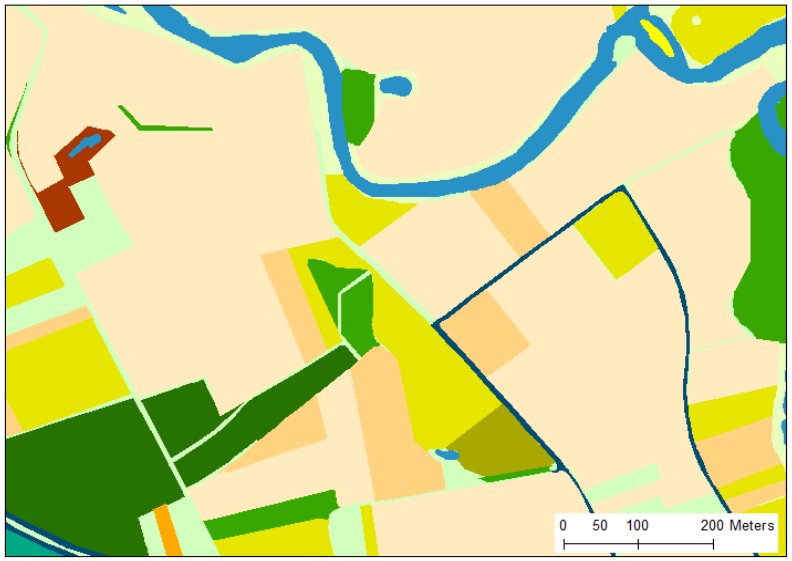
**Aims**:

*Application of the SEEA EEA approach for Limburg Province: test case for 8 ecosystem services (ES)*

**Products**:

1. Ecosystem Units map
2. Economic Users map based on ISIC registry
3. Physical and monetary ES supply models (spatially explicit)
4. Physical and monetary ES Supply and Use Accounts

# Ecosystem Units map

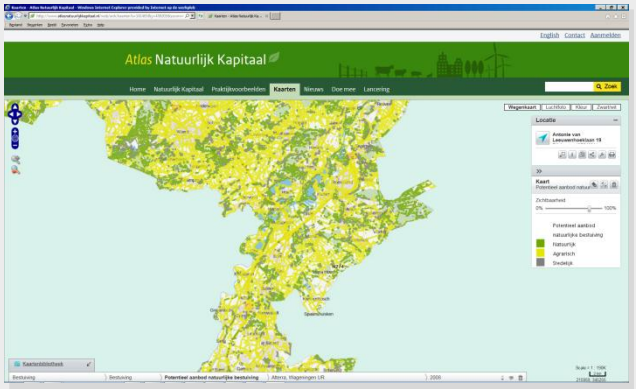



- Non-perennial plants
- Perennial plants
- Greenhouses
- Meadows (grazing)
- Bushes and hedges bordering fields
- Farmyards and barns
- Dunes with permanent vegetation
- Active coastal dunes
- Beach
- Deciduous forest
- Coniferous forest
- Mixed forest
- Heath land
- Inland dunes
- Fresh water wetland
- (semi) Natural grassland
- Public green space
- Other unpaved terrain
- Riverflood basin
- Salt marsh
- Residential area
- Industry: offices and businesses
- Services: offices and businesses
- Publica administration: offices and businesses
- Roads, parking lots, runway, other
- Forestry: offices and businesses
- Fishery: offices and businesses
- Non-commercial services: offices and businesses
- Sea
- Lakes and ponds
- Rivers and streams
- Other

**Map inputs**:

- Cadastral map
- Topographical map
- Agricultural crops grown
- Address based business register
- Addresses of buildings
- Ramsar map
- Land use statistics

# Methods: Supply and use




Ecosystem service map

x

= Supply per Ecosystem Unit

or

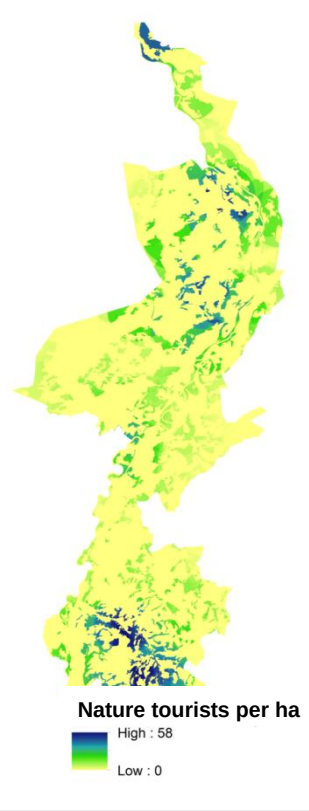
ES model based on EU map


= Supply per Ecosystem Unit

# Biophysical ecosystem service models

- Look-up table models, e.g. carbon sequestration


- Complex models, e.g. nature tourism
  - Allocation model for tourists, data:
    - Location of accomodation near nature reserves
    - Capacity and occupancy rates
    - Distance and road travelled to nature



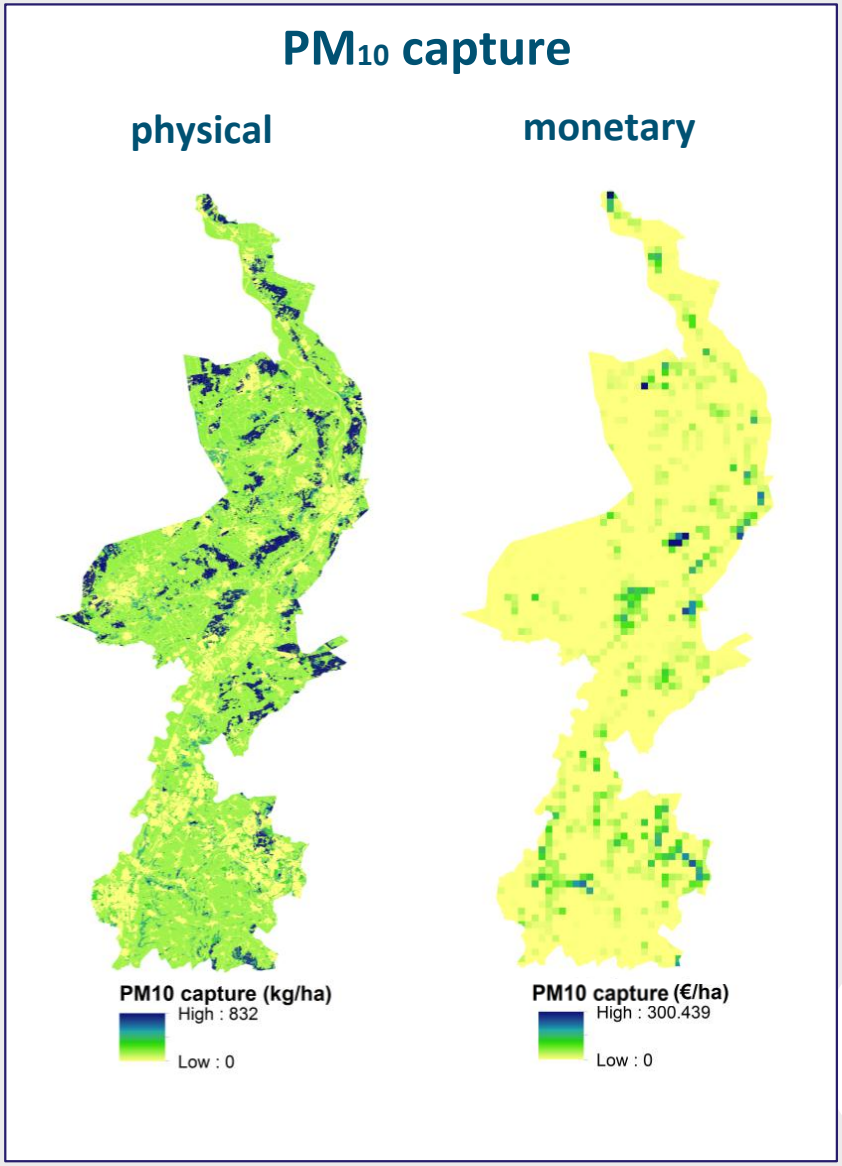
# Monetary ecosystem service models

**Methods**:

- Resource rent
- Avoided damage costs
- Replacement costs

> Exclusion of consumer surpluss

Example: air quality regulation



# Physical and monetary supply tables

| Ecosystem services | Ecosystem Units | 1 Non-perennial plants | 2 Perennial plants | 4 Meadows (for grazing) | 5 Hedgerows | 21 Deciduous forest | 22 Coniferous forest | 23 | 24 | 26 ds | 27 | 28 | 31 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | extent (ha) | 53.600 | 8.100 | 27.100 | 2.900 | 11.400 | 7.100 | 10. | | | | | | |
| Crops | tonnes/yr | 1.427.300 | 65.000 | - | - | - | - | | | | | | | |
| Fodder | tonnes/yr | 140.800 | 4.700 | 328.700 | - | - | - | | | | | | | |
| Meat (from game) | kg/yr | 11.500 | 1.500 | 5.900 | 800 | 2.500 | 1.700 | 2 | | | | | | |
| Ground water (drinking water only) | in 1000 m3/yr | 9.000 | 1.400 | 4.200 | 500 | 1.900 | 100 | | | | | | | |
| capture of PM10 | tonnes/yr | 400 | 100 | 200 | - | 300 | 400 | | | | | | | |
| Carbon sequestration | tonnes C/yr | - | 2.400 | 4.900 | 500 | 16.500 | 10.300 | 15. | | | | | | |
| Recreation (cycling) | 1000s of bike trips/yr | 1.800 | 300 | 1.000 | 100 | 600 | 200 | 400 | - | - | 100 | 200 | 600 | **9.100** |
| Nature tourism | # tourists/yr | 94.000 | 22.000 | 136.800 | 57.000 | 160.300 | 93.800 | 147.400 | 22.700 | 11.600 | 55.400 | 11.800 | 94.500 | **974.300** |

| | | Non-perennial plants | Meadows (for grazing) | Hedgerows | Deciduous forest | Coniferous forest | Mixed forest | Heath land | Fresh water wetlands | Natural grassland | Public green space | Other unpaved terrain | River flood basin | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| extent | ha | **53.629** | **27.066** | **2.940** | **11.414** | **7.091** | **10.437** | **2.149** | **936** | **3.121** | **4.761** | **22.591** | **14.126** | **220.922** |
| Crops | € | 35.303.100 | - | - | - | - | - | - | - | - | - | - | - | **37.908.400** |
| Fodder | € | 1.960.900 | 4.587.100 | - | - | - | - | - | - | - | - | - | 942.300 | **7.556.200** |
| Meat (from game) | € | 817.700 | 223.400 | - | 186.800 | 192.700 | 261.100 | 35.600 | 12.700 | 32.900 | 14.700 | 211.200 | 136.000 | **2.249.400** |
| Ground water | € | 3.861.200 | 1.802.300 | 193.900 | 824.200 | 63.500 | 218.700 | 57.300 | 11.200 | 295.700 | 192.600 | 1.041.100 | 545.700 | **11.602.800** |
| Capture of PM10 | € | 301.200 | 173.700 | 30.400 | 200.200 | 185.700 | 200.700 | 27.200 | 2.400 | 46.700 | 78.100 | 258.200 | 85.900 | **2.275.900** |
| Carbon sequestration | € | 300 | 165.700 | 18.000 | 562.500 | 350.300 | 515.000 | 13.200 | 6.400 | 19.300 | 40.500 | 139.000 | 95.600 | **2.006.100** |
| Nature tourism | € | 4.410.000 | 6.349.100 | 2.357.700 | 6.930.100 | 3.162.500 | 5.443.100 | 917.000 | 392.800 | 2.488.900 | 625.900 | 2.870.600 | 3.162.100 | **41.816.200** |
| Recreation (cycling) | € | NA | | | | | | | | | | | | **NA** |
| | € | **46.654.400** | **13.301.400** | **2.600.000** | **8.703.800** | **3.954.700** | **6.638.800** | **1.050.400** | **425.400** | **2.883.500** | **951.700** | **4.520.200** | **4.967.500** | **105.415.000** |
| value per ha (excl. Amenity) | €/ha | **870** | **491** | **884** | **763** | **558** | **636** | **489** | **454** | **924** | **200** | **200** | **352** | **477** |
| value per ha (incl. Amenity)* | €/ha | **870** | **491** | **884** | **1.193** | **988** | **1.066** | **489** | **454** | **924** | **688** | **220** | **352** | **553** |

# Monetary use account

| Ecosystem services | Economic Users (ISIC Sections) / Units | A | B-D | E | F-H | I,R | Rest | Export | Household cons. | Gov. cons. | Investments | Inventories | Env (global goods) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crops | million € | 37.9 | | | | | | | | | | | |
| Fodder | million € | 7.6 | | | | | | | | | | | |
| Meat (from game) | million € | | | | | | | | 2.2 | | | | |
| Ground water (drinking water only) | million € | | | 11.6 | | | | | | | | | |
| Capture of PM10 | million € | | | | | | | | 2.3 | | | | |
| Carbon seq. | million € | | | | | | | | | | | | 2.0 |
| Nature tourism | million € | | | | | 41.8 | | | | | | | |

# Ecosystem contribution (7 services) to the economy of Limburg

| Ecosystem service | Total revenue (million €) | ES contribution (million €) |
|---|---|---|
| Crop production | 386 | 37.9 |
| Fodder production | 86 | 7.6 |
| Drinking water production | 104 | 11.6 |
| PM10 filtration | - | 2.3 |
| Carbon sequestration | - | 2.0 |
| Nature tourism | 248 | 41.8 |
| Hunting | - | 2.2 |

# Take home messages

- Ecosystem accounting in the Netherlands: feasible and in demand (UN, World Bank WAVES program, national governments)

- Challenges: monetary valuation, data availability

The main strength of ecosystem accounting is NOT to calculate the total value of ecosystems as precisely as possible.

Its main strength is in providing (inter)nationally consistent numbers and timeseries

# Thank you

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**Project participants**:

Wageningen University: Lars Hein and Roy Remme

Statistics Netherlands: Rixt de Jong, Sjoerd Schenau, Bram Edens, Niek van Leeuwen, Marijn Zuurmond