Presumptions for Natural Capital Accounting: example of a pilot economic valuation approach

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Actualities

Natural Capital Index calculations or NCA – recently not a usual element of disposable capital calculations

Natural Capital – crucial part of sustainable development:

- The *weak sustainability* - **gross value** of disposable capital should not decrease.

- The *strong sustainability* - sustainability of **ecological (natural) capital** should stay on a non-declining level – *it would secure no contraction of the needs in the future and, concurrently, sustainable development.*

Actualities

Common net capital account elements, reflected in the taxes:
- Water use;
- Mining products (mainly mineral resources);
- Forest stands and wood production;
- Game species use;
- Fish resources use.

Example 1:

Approximate value of stock forest in the state forests (~830 000 ha) - >**1 bln. €**, but it is *only* III-IV groups of forest stands, so:
- I-II groups (protected) not included,
- forest land price – not included,
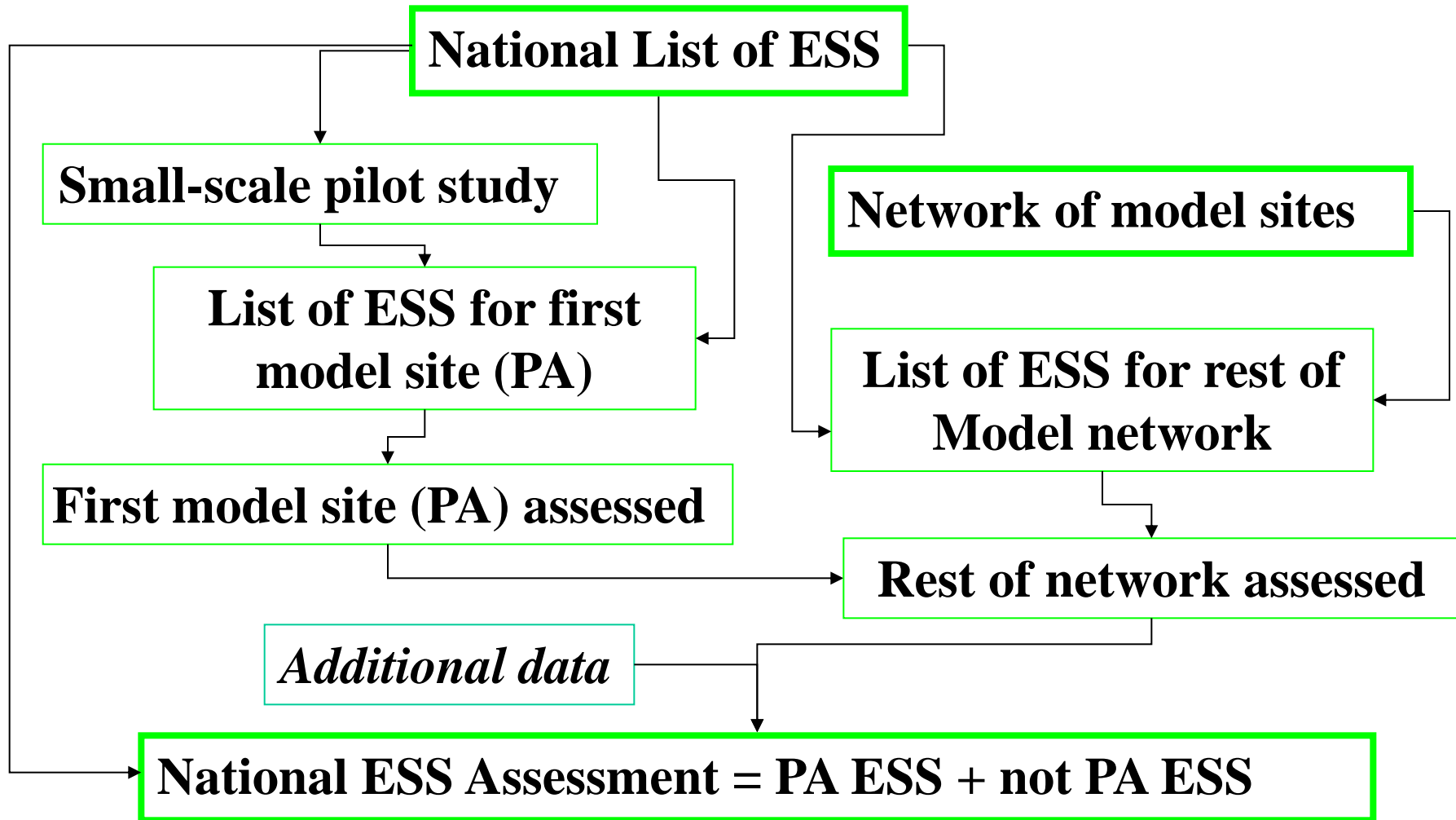- other ESS, of course, not included.

Project design

- **Establishing of the primary *national set of ecosystem services***

- Precise mapping/evaluation of *small-scale case study* site

- Establishing a sufficient *network of complex model areas*

- **Evaluation of ESSs' *comparative degree of significance* for complex model areas**

- **Selection of ESS with high/medium degree of significance for *itemisation***

- **Evaluation of the main *ESS stocks* (mapping) and *use* in model areas**

- ***Economic value* identification for the main *ESS* in model areas**

- Extrapolation and merging with other data and info from model areas network for *national mapping/assessment of ESS*

Project design

National List of ESS

Small-scale pilot study

Network of model sites

List of ESS for first model site (PA)

List of ESS for rest of Model network

First model site (PA) assessed

Rest of network assessed

Additional data

National ESS Assessment = PA ESS + not PA ESS

List of the main ESS (not itemized) established:

Provisioning
Food:
Food crops
Livestock
Capture fisheries&Aquaculture
Wild Foods
Fibre:
Timber
Linen
Wood fuel
Fuel crops
Peat & minerals
Genetic resources
Biochemicals & medicines
Freshwater

Regulating	
Air quality regulation:	**Noise regulation**
CO_2 sequestration	**Natural hazard regulation**
N, P, S removal	
Climate regulation:	
global	
regional and local	
Erosion regulation:	
soil water erosion	
soil wind erosion	
Water purification	
Soil quality regulation	
Detoxification of waste	
Disease regulation	
Pest regulation	

Project design

List of of the main ESS (not itemized) established:

Cultural	Supporting
Recreation & Amenity	**Energy capture (primary production)**
Scientific values	**Nutrient cycling**
Educational values	**Pollination**
Spiritual & religious values	**Habitat**
Aesthetic values	**Soil formation**
Inspiration	
Social relations	
Sense of place	

Main ecosystems addressed:

forest, wetland, grassland, cultivated/agriculture land, inland water

Evaluation of ESS assets and actual use intensity

- **Primary research:**

  Biodiversity evaluation (territory mapping+expected numbers),

  In-situ observations (monitoring),

  Interviews/questionnaires for stakeholders;

- **Spatial data analysis:**

  Corine Land Cover data

  Protected areas GIS database

  Woodland Key Habitat inventory maps

  Inventory of Habitats of EU importance

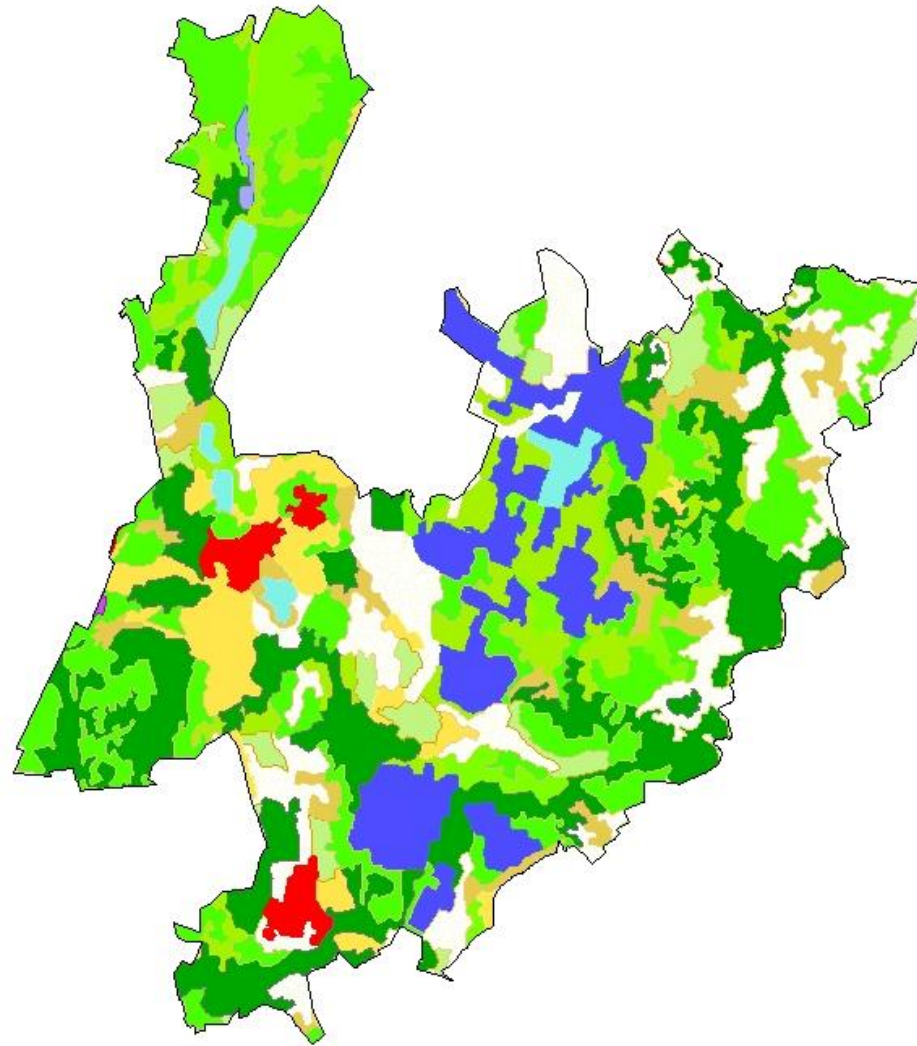 *Territorial use potential (zoning) GIS layers*

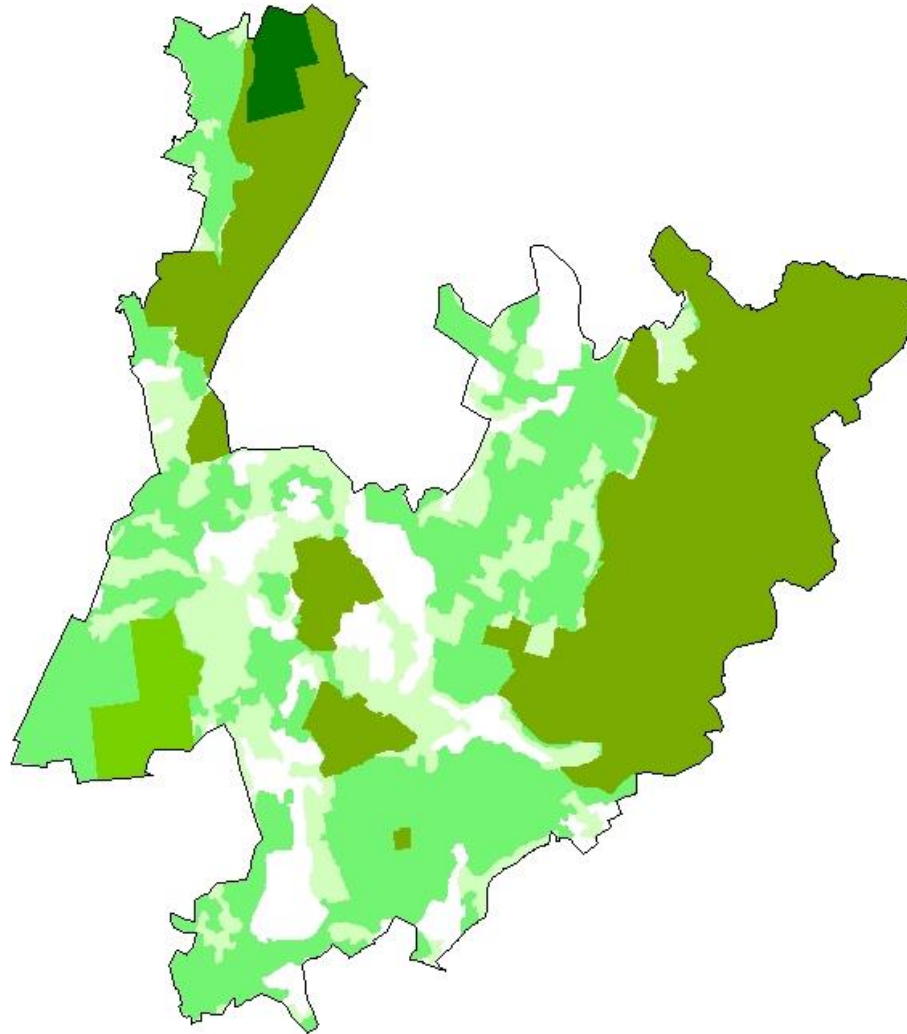 *Aerial pictures for precise initial analysis*

**Genuine
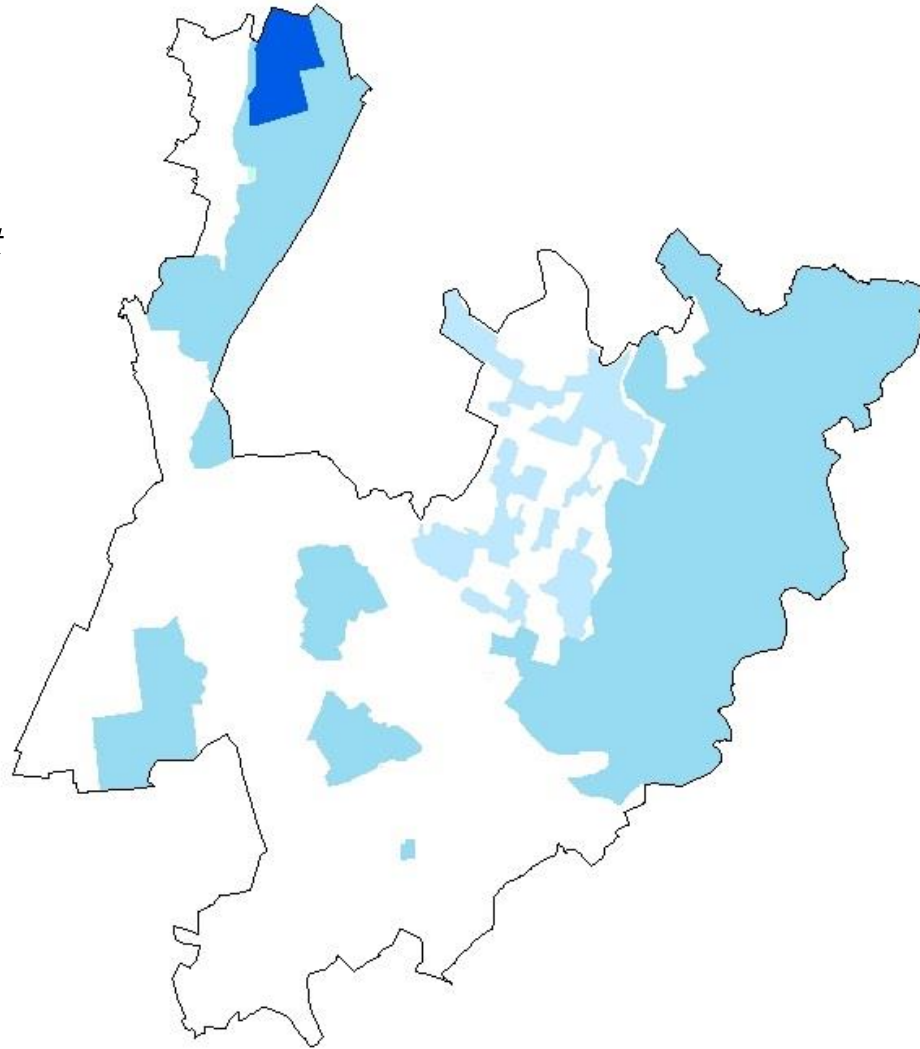CLC RGB**

*Ecological
background*

Cultural ESS:
Cognitive development
(scientific value)

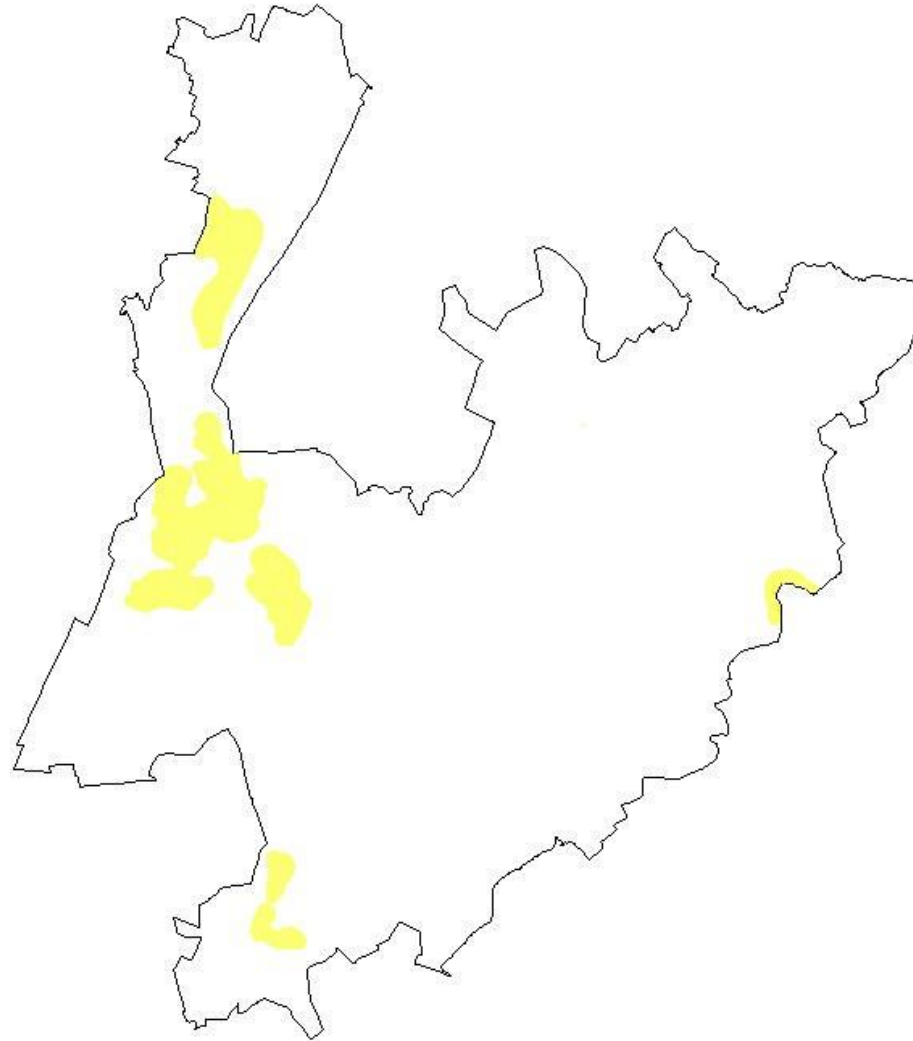*Supporting ESS:*
Habitat provision
(high nature value)

Provisioning ESS:
Genetic resources

Cultural ESS:
Recreation & Amenity

Economic evaluation methods

- **Market value**

- **Cost-based (Shadow pricing)**

- **Travel costs**

- **Hedonic pricing**

- **Willingness to pay**

- **Benefit-transfer -** for ESS with global or national effect, like *carbon dioxide sequestration, climate change, water purification, erosion, habitat provision*, etc.

Economic evaluation methods

Example 2:

Income loss during fishing activity shutdown period:

$$Kt = d \times L1d \text{ , where:}$$

Kt – income loss;
d – number of days, available for fishing
L1d – per day tariff, calculated:

$$L1d = \sum (Zt \times p) : d \text{, where:}$$

Zt – kg of the specific fish species ((last year annual mean);
p – market price per kg of the specific fish species (last year annual mean);
d - number of days, available for fishing

Economic evaluation methods

Example 3: wild foods: **mushrooms – parameters evaluated**:
- Mean productivity,
- Loss by worm-eating,
- Mushroom activity type (industrial, individual),
- Productivity according forest type;
- Productivity according regional localisation;
- Productivity according season (3 seasons – starting, mushroom actvity peak, growth intensity peak);
- Area of use;
- Use intensity (person/day, proximity, frequency parameters);
- Local habits.

First results of monetarization

Service class	Service/goods	Annual monetary value, €/year	Immediate monetary value, €
Provisioning	Timber	1.057.334	11.029.450
	Peat	70.000	2.800.000
	Wild foods (forest)	1.025.366	
	Genetic resources	6.338	
	Fish	5.052	
	Fresh water	152.945	
Regulating	Climate regulation	379.951	
	Air quality regulation	1.404.601	
	Water purification	734.764	
	Pest regulation	38.663	
	Soil erosion prevention	1.196.559	
Cultural	Camping	618.026	
	Fishing	22.500	
	Cognitive development, nature watching	87.000	
	Travel costs avoided	220.600	
Supporting	Nutrient cycling & soil formation	601.037	
	Pollination	792.687	
	Habitat provision	2.719.729	
	TOTAL (LT prices):	**11.133.152**	**13.829.450**

First results of monetarization

Service class	Service/goods	Approximate differences of annual monetary value of ESS, €/year	
		Value in the Protected area	*Value outside the Protected area*
Provisioning	Timber	**40-60%**	**100%**
	Peat	**10-15%**	**100%**
	Wild foods (forest)	**80-90%**	**100%**
	Genetic resources	100%	20-30%
	Fish	85-90%	100%
	Fresh water	100%	70-80%
	Air quality regulation	100%	90-100%
	Water purification	100%	60-85%
	Pest regulation	100%	50-70%
	Soil erosion prevention	**100%**	**50-60%**
Cultural	Camping	**100%**	**20-35%**
	Fishing	**100%**	**80-90%**
	Cognitive development, nature watching	**100%**	**20-30%**
	Travel costs avoided	**100%**	**10-30%**
Supporting	Nutrient cycling & soil formation	**100%**	**65-80%**
	Pollination	**100%**	**40-60%**
	Habitat provision	**100%**	**40-60%**

ESS complex in PA *vs* regular ESS complex = 1,28

Presumptions for Natural Capital Accounting: example of a pilot economic valuation approach

Limitations I

- **Strong emphasize on** *final ecosystems services and goods* **taken into account!**

- **Mainly** *actual use of services* **was analyzed,** *not* **the** *capacity* **of ecosystem to provide a service!**

- **Not all ESS, important to the area,** *taken into account*, e.g. *provisioning:* wild berries, wild flowers, medicine plants; *regulating:* hydrological regime stability, etc.

Limitations II

- **Problems in Natural Capital Index calculations:**
- **Which type of Natural Capital?:**
    - habitat size + native species abundance, i.e.

    NCI = ecosystem quantity (%) x ecosystem quality (%)?

    - non-artificial and non-social Capital (air, water, land, biodiversity and all other formations of the biosphere)?;
- Market value differences (e.g. for forest production 1 m^3 net income in Sweden – 4 to 20 **times** higher, than in Lithuania (prices – **international** market mean value + **national** costs for extraction/catch/use, etc.);
- Mining products and underground/ground water not included (following SEEA notes on abiotic goods, as being not a usual part of ecosystem);
- Problems with supporting services – **to be or not to be** included?..

Linkages

Natural Capital Index	⟷	ESS assessment

- Habitats size;
- Native species abundance;
- Ecosystem quality;
- Provisioning (some supporting?) ESS (potential ESS?) assets;
- Provisioning ESS (potential ESS?) value

Preliminary NCI for the pilot area

| Natural Capital Index | ⟷ | ESS assessment |

Habitats	NCI
Artificial surfaces	0,092
Arable land and permanent crops	0,725
Pastures	2,429
Heterogeneous agricultural areas	3,208
Broad-leaved forest	3,849
Coniferous forest	15,26
Mixed forest	15,35
Transitional woodland-shrub	3,594
Wetlands	6,819
Inland waters	1,654
Total (18159 ha):	*52,98*

Thank You!