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# Synthesis of ecosystem service assessments: Proposal for a common framework

*Johannes Förster, Stefan Schmidt, Ralf Seppelt - UFZ, Leipzig*

*Status Conference, 19. April 2013, Berlin*

**www.sustainable-landmanagement.net**

# Synthesis - Aim

- Research
- Decision support for practitioners
- Policy support

# Opportunities for synergies

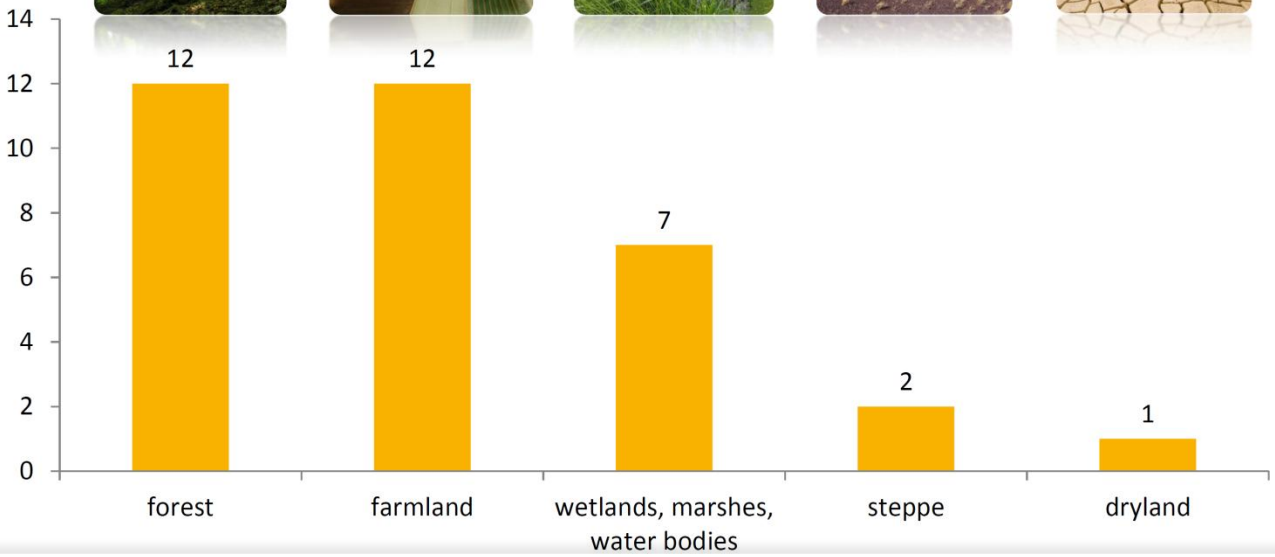
ongoing activities related to science for decision making and policy advice

- Global Land Programme of IHDP –> endorsed SLM Programme
- Programme on Ecosystem Change and Society PECS
  10-year programme under ICSU –> endorsed SLM Programme
- Economics of Land Degradation ELD
  –> links established and RPs submitted case studies

- SGA Network (UNEP-WCMC)
  bringing together researchers & practitioners –> endorsed SLM Programme
- IPBES -> direct access to official channels
- UN Conventions CBD, UNCCD, UNFCCC –> direct access to official channels

# Diversity in the Sustainable Land Management Programme

## What ecosystem types are being investigated?

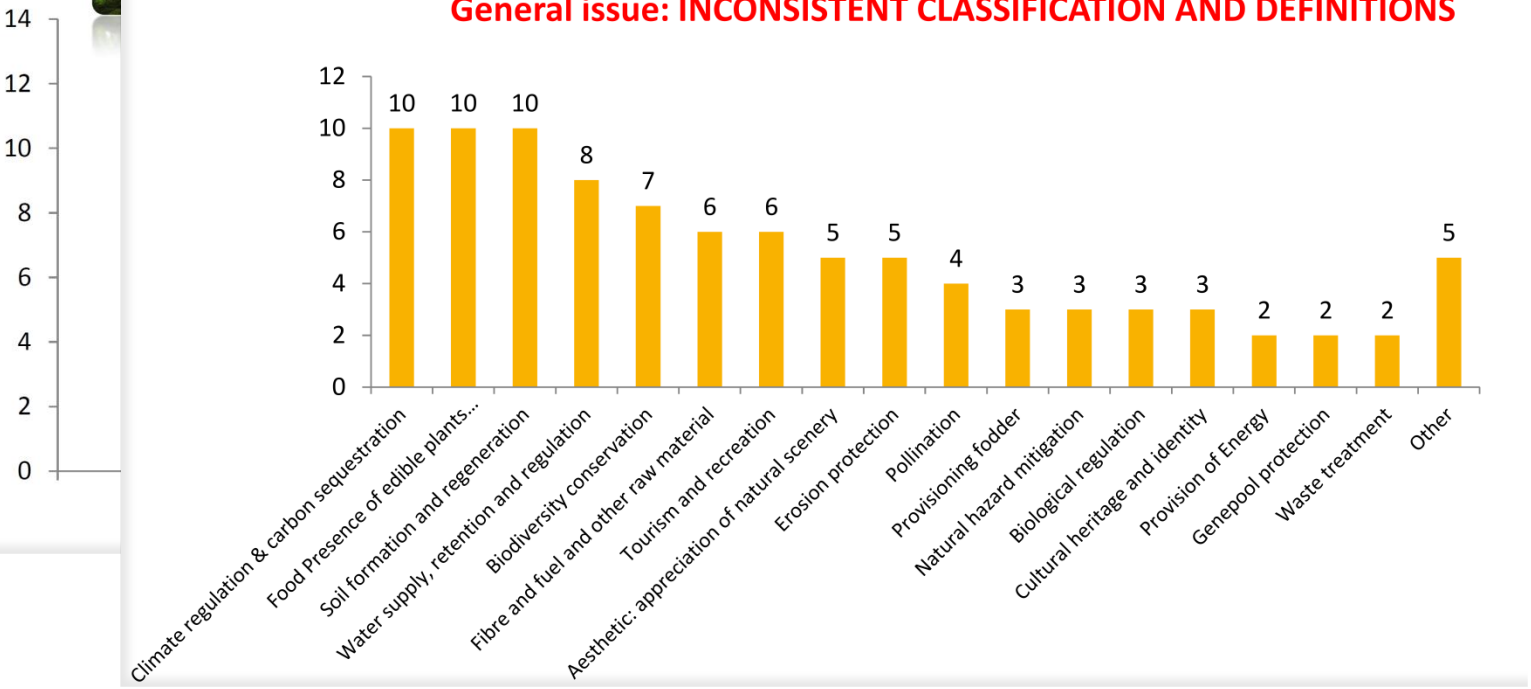


# Diversity in the Sustainable Land Management Programme

## What ecosystem types are being investigated?

## What ecosystem goods and services are being investigated?

**General issue: INCONSISTENT CLASSIFICATION AND DEFINITIONS**



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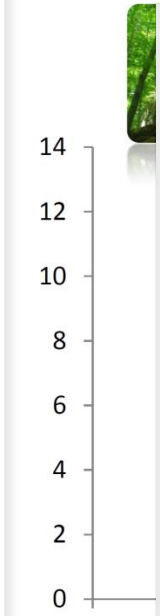

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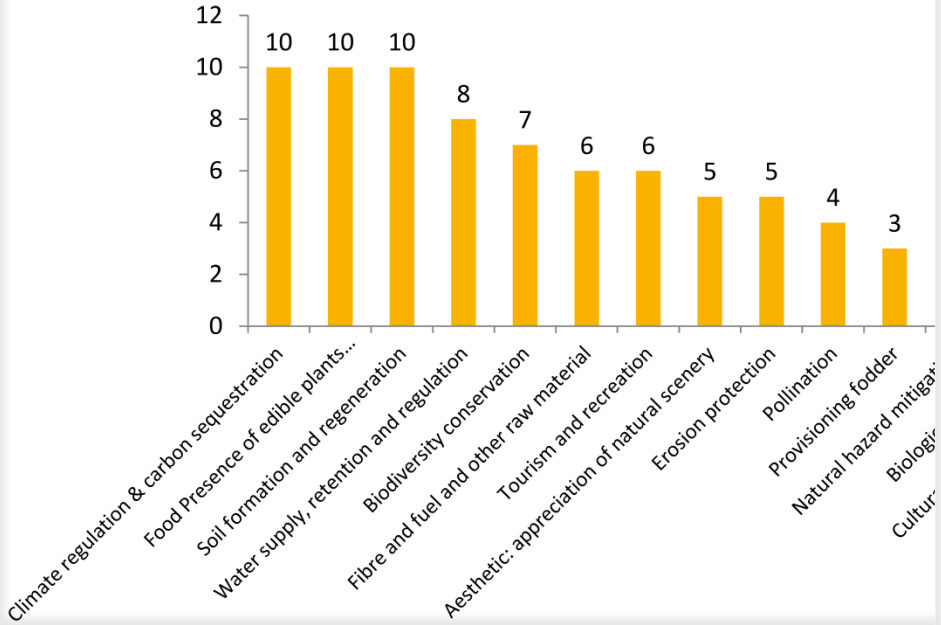
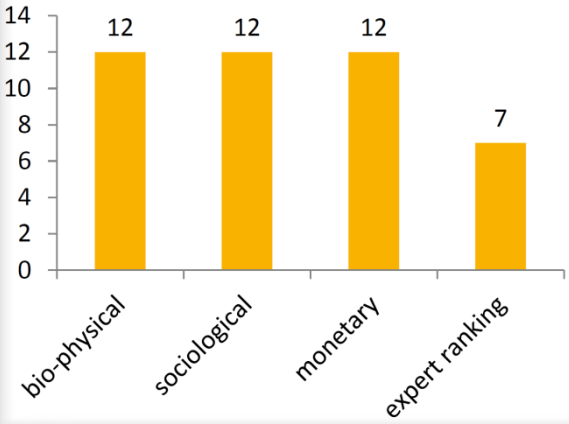



## What type of indicators are used to analyze the ES?



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Status Conference, Berlin 2013

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# Synthesis - Means

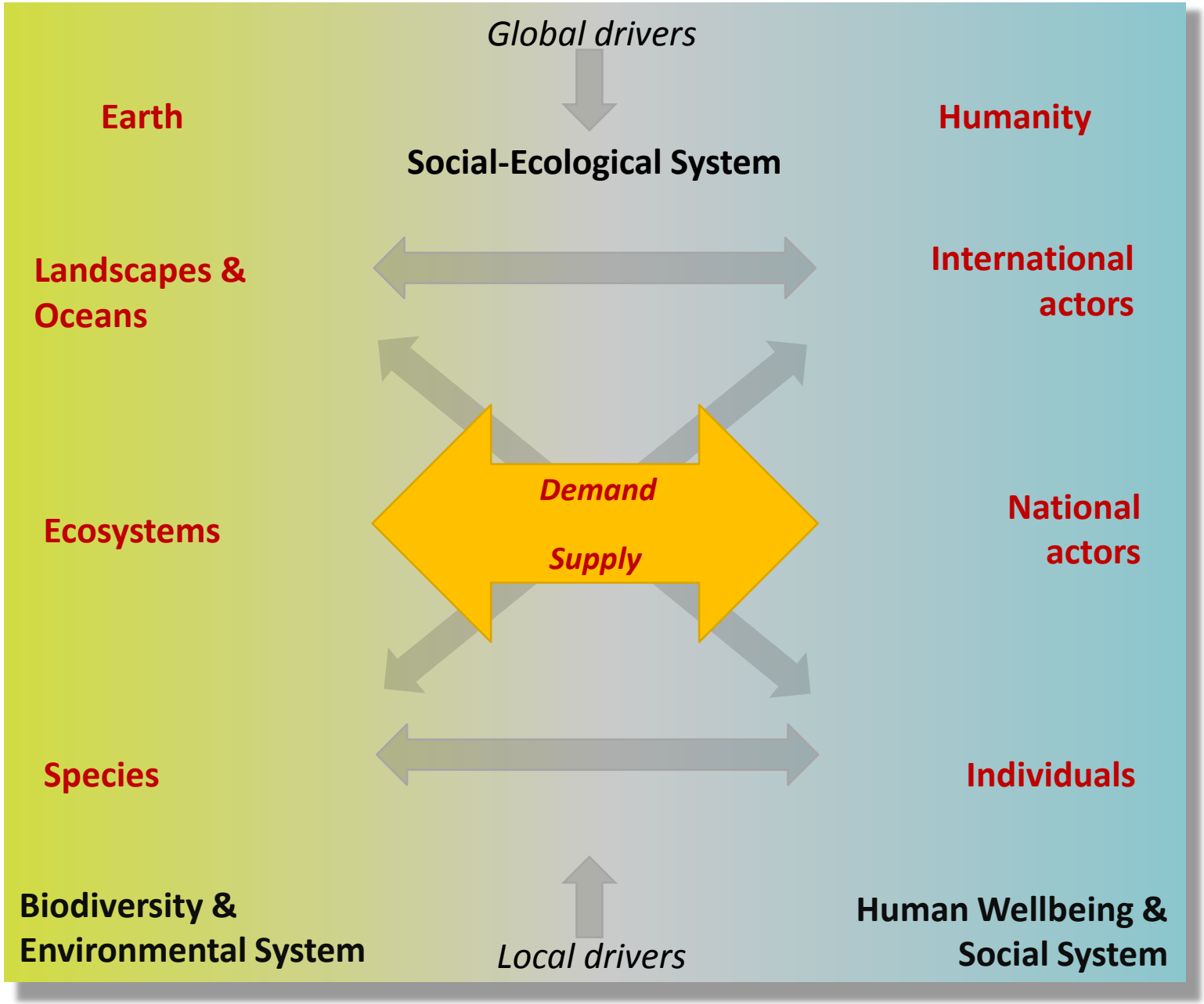
- Assessment framework -> common understanding of the role of ES in SLM
- Common classification of ES -> consistency in the use of terms
- Analytical framework: Standards for synthesising information and results related to defined aspects/topics

- ➢ Building on exisiting approaches (comparable, compatible, credible)
- ➢ Translating information into common terms: from case specific to general
- ➢ Sharing of lessons learned: what works and why -> Guidance and Tools

# Synthesis framework that allows the integration of:

- Ecological, socio-economic, cultural systems
- Common classification of ES (MA -> TEEB & UK NEA -> CICES)
- Aspects of land management (incl. governance, policies, decision making)
- Stakeholder (communities, scientists, decision makers, land managers)
- Land management as a **process** over space, time, between different actors

# Framework for analysing the role of ecosystem services in land management




*Ostrom 2007*

*MA 2005*

*Förster and Seppelt in prep.*

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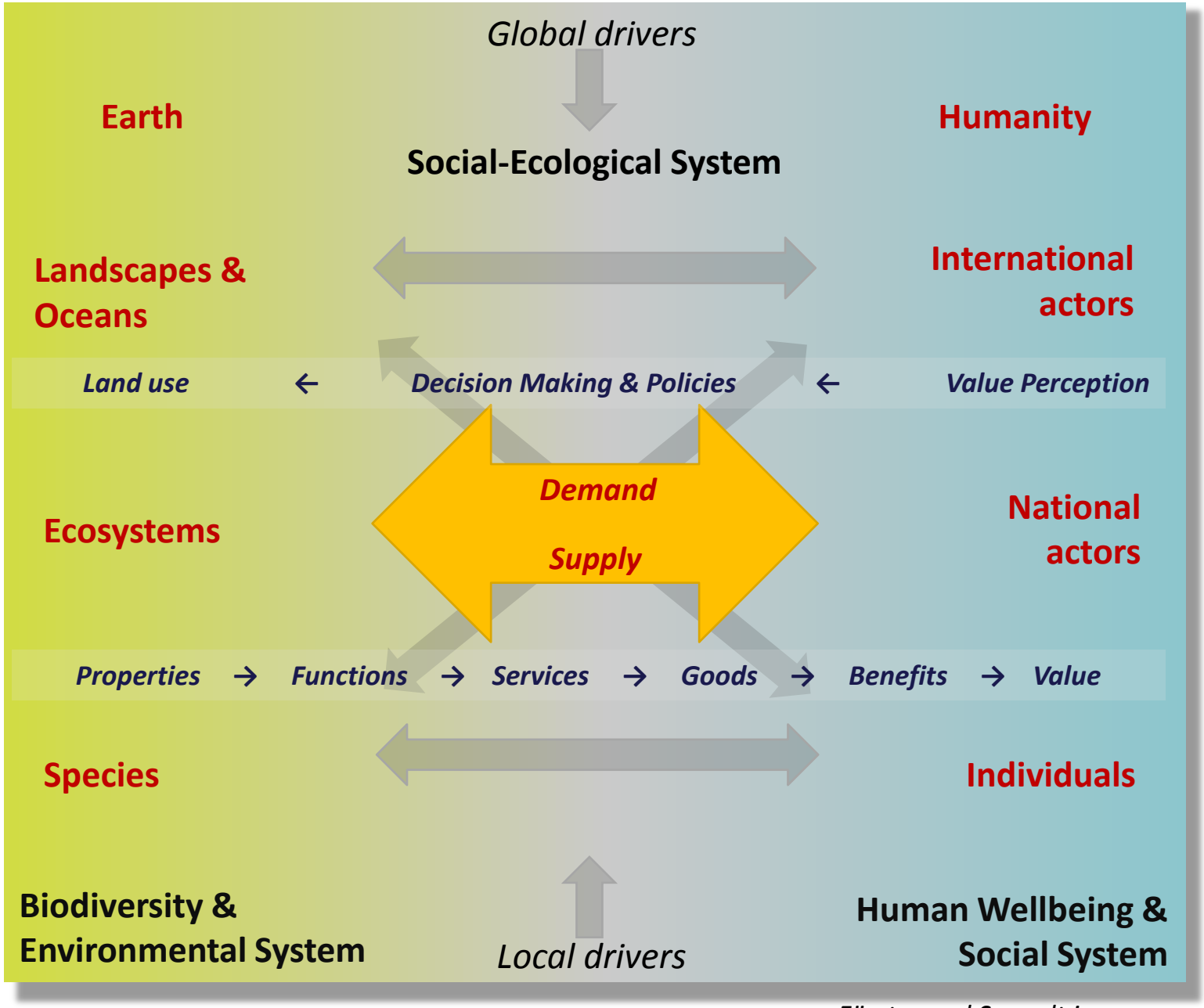


*Ostrom 2007*

*van Oudenhoven et al. 2012*

*Haines-Young & Potschin 2010*

*de Groot et al. 2010 (TEEB D0 Chapter 1)*

*UK NEA 2011*

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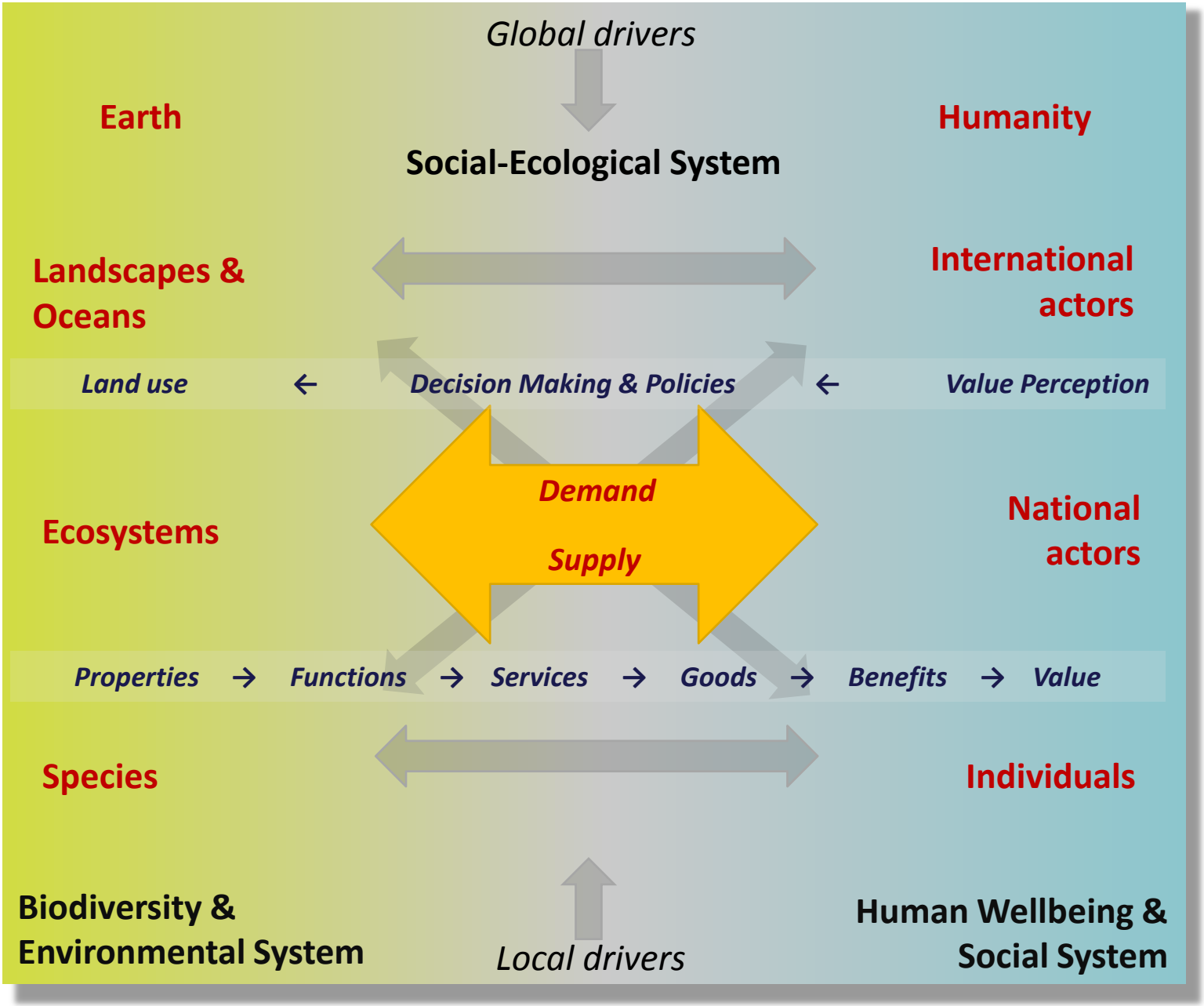
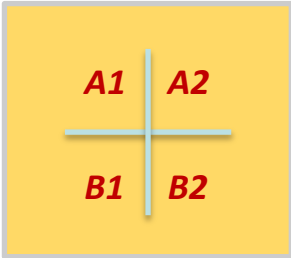
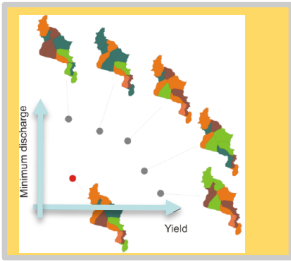
# Framework for analysing the role of ecosystem services in land management




Scenarios




Synergies & Trade-offs




Förster and Seppelt in prep.

# Analytical Framework – overview of possible categories

| Reference | | | | | | | |
|---|---|---|---|---|---|---|---|
| Author | Year | Title | Journal | Type | Data | Contact | Data accesibilit |

| Geographical charatcerisitics | | | | | | |
|---|---|---|---|---|---|---|
| Country | Name of investigation area | Biome / Land cover | Land use | Delineation of investigation area | Area in ha | Geo-coordinates |

| Context of study | | | | |
|---|---|---|---|---|
| Major problems | Drivers | Pressures | Aim of study | knowledge gaps / information needs identified |

# Analytical Framework – overview of possible categories

| Ecosystem services | | | | | |
|---|---|---|---|---|---|
| ES category | ES type | Final ES (unit) | Good (unit) | Benefit | Beneficiary |

| Biophysical assessment | | | | | | |
|---|---|---|---|---|---|---|
| Method type | specific method/ tool used | Source of input data | Measured indicator | Quantity | Unit of biophysical indicator | biophysical value |

| Valuation (monetary and non-monetary) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Method type | Specific method/ tool used | Source of input data | Indicator for valued good | Quantity | Unit and currency | Monetary value | Year of valuation |

# Analytical Framework – overview of possible categories

| **Overall results and recommendations** | | | | |
|---|---|---|---|---|
| **Type of result** | **Impact scale** | **Uncertainties** | **Reviewed** | **Lessons learned** (for future assessments) |

| **Governance context of the assessment** | | | |
|---|---|---|---|
| **Stakeholders involved in study** | **The number of people directly involved in the assessment process** | **Scale of policy process** | **Policy/ Economic instrument** |

| **Implementation/Follow up** | | |
|---|---|---|
| **Action resulting from assessment** | **Policy impact, e.g. policy and actions informed** | **Land use change** |

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- **Example:**

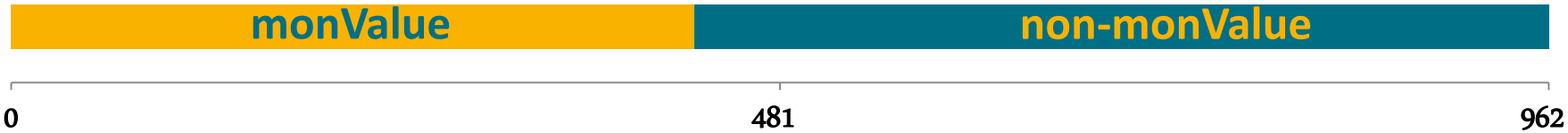
  **Synthesis and meta-analysis of economic valuation of ES**

Stefan Schmidt

Status Conference Sustainable Land Management

April 19, 2013

# Valuation of case studies




- three main thesis for monetary valuation

1) What is not valued get lost

2) Money is an easy understandable indicator for ES around the world

3) Powerful indicator for decision making, especially in low developed countries

? **How robust are the monetary values as an indicator for ES?**

? **Which ecological & socio-economic variables effect monetary valuation of specific ES?**



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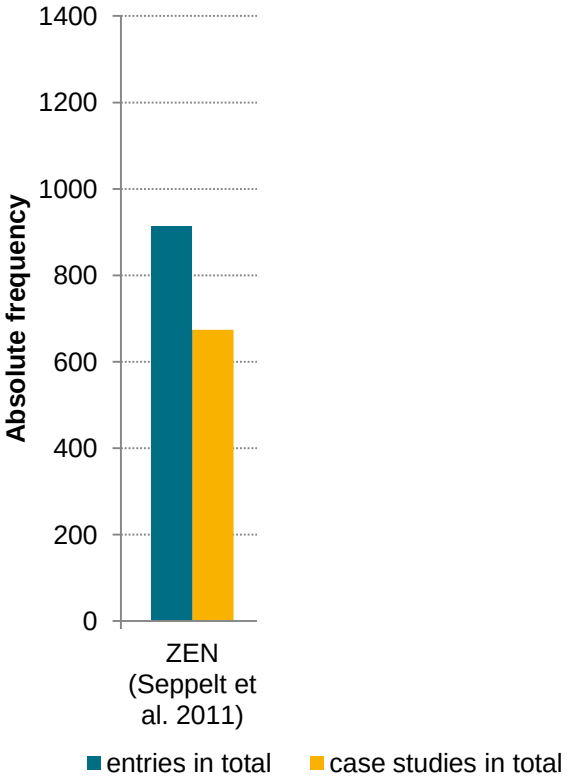
# Methods

## databases




Journal of Applied Ecology

*Journal of Applied Ecology* doi: 10.1111/j.1365-2664.2010.01952.x

FORUM

**A quantitative review of ecosystem service studies: approaches, shortcomings and the road ahead**

**Ralf Seppelt*, Carsten F. Dormann, Florian V. Eppink, Sven Lautenbach and Stefan Schmidt**

*UFZ – Helmholtz Centre for Environment Research, Department of Computational Landscape Ecology, Permoserstraße 15, 04318 Leipzig, Germany*

**Summary**

1. Ecosystem services are defined as the benefits that humans obtain from ecosystems. Employing the ecosystem service concept is intended to support the development of policies and instruments that integrate social, economic and ecological perspectives. In recent years, this concept has become the paradigm of ecosystem management.
2. The prolific use of the term 'ecosystem services' in scientific studies has given rise to concerns about its arbitrary application. A quantitative review of recent literature shows the diversity of approaches and uncovers a lack of consistent methodology.
3. From this analysis, we have derived four facets that characterise the holistic ideal of ecosystem services research: (i) biophysical realism of ecosystem data and models; (ii) consideration of local trade-offs; (iii) recognition of off-site effects; and (iv) comprehensive but critical involvement of



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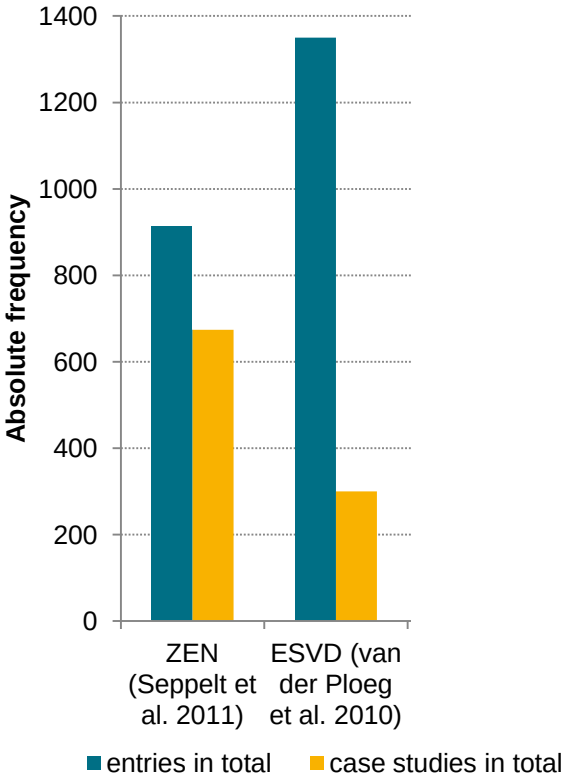
# Methods

## databases

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Summary

Ecosystem Services 1 (2012) 50–61

Contents lists available at SciVerse ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

Global estimates of the value of ecosystems and their services in monetary units

Rudolf de Groot [a,*], Luke Brander [b,1], Sander van der Ploeg [a], Robert Costanza [c], Florence Bernard [d], Leon Braat [e], Mike Christie [f], Neville Crossman [g,h], Andrea Ghermandi [i], Lars Hein [a], Salman Hussain [j], Pushpam Kumar [k], Alistair McVittie [j], Rosimeiry Portela [l], Luis C. Rodriguez [g,h], Patrick ten Brink [m], Pieter van Beukering [b]



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## Methods

Value transformation

- "paper value" in different units,
  **e.g. £/acre**

**1604 monetary values**

- conversion into annual value of local currency per hectare & year,
  **e.g. £/ha/yr**
- adjusting to reference year 2007 with World Bank deflator,
  **e.g. £/ha/2007**
- conversion to internat. Dollar with World Bank PPP,
  **e.g. Int-$/ha/2007**

**1016 monetary values**

# Methods

- Georeference with GIS





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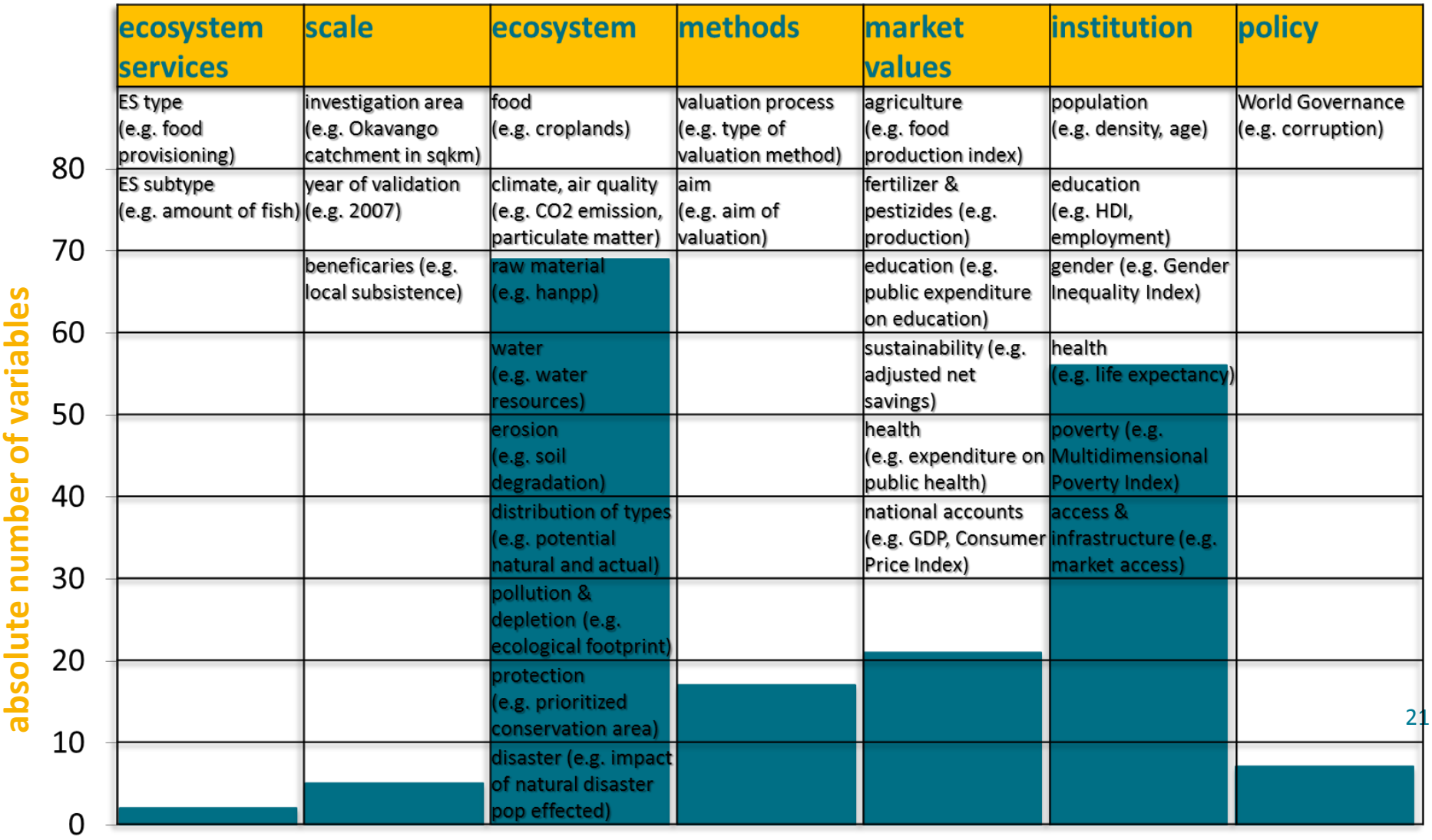
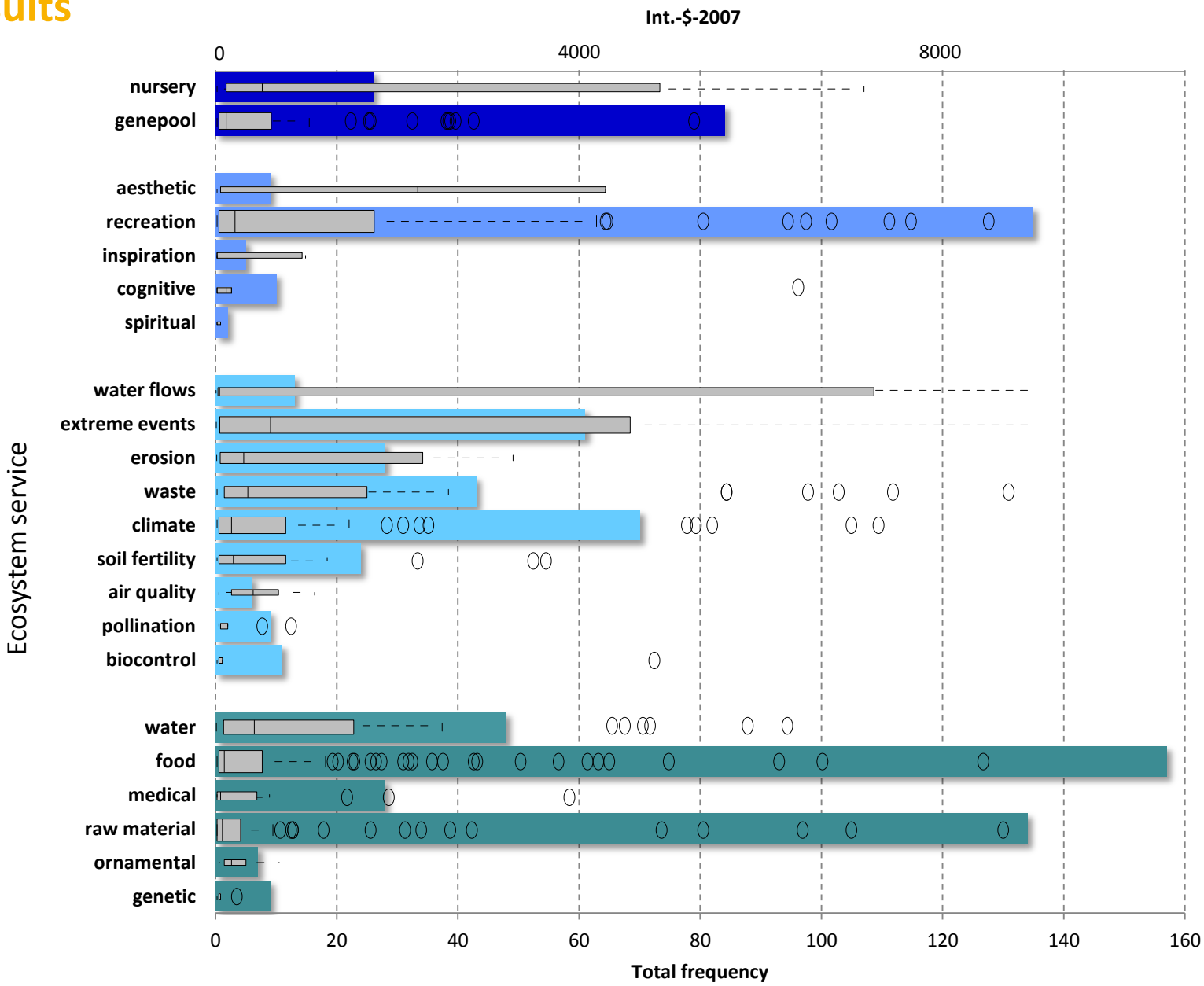
# Methods

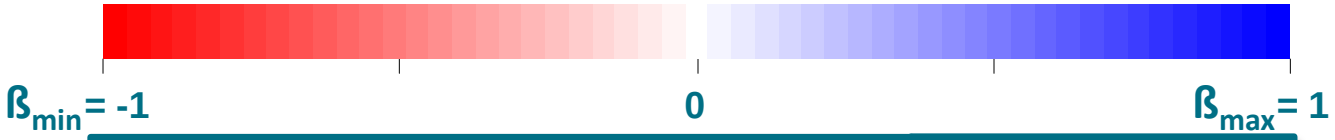

absolute number of variables
80
70
60
50
40
30
20
10
0
ecosystem services
scale
ecosystem
methods
market values
institution
policy
ES type (e.g. food provisioning)
investigation area (e.g. Okavango catchment in sqkm)
food (e.g. croplands)
valuation process (e.g. type of valuation method)
agriculture (e.g. food production index)
population (e.g. density, age)
World Governance (e.g. corruption)
ES subtype (e.g. amount of fish)
year of validation (e.g. 2007)
climate, air quality (e.g. CO2 emission, particulate matter)
aim (e.g. aim of valuation)
fertilizer & pestizides (e.g. production)
education (e.g. HDI, employment)
beneficaries (e.g. local subsistence)
raw material (e.g. hanpp)
education (e.g. public expenditure on education)
gender (e.g. Gender Inequality Index)
water (e.g. water resources)
sustainability (e.g. adjusted net savings)
health (e.g. life expectancy)
erosion (e.g. soil degradation)
health (e.g. expenditure on public health)
poverty (e.g. Multidimensional Poverty Index)
distribution of types (e.g. potential natural and actual)
national accounts (e.g. GDP, Consumer Price Index)
access & infrastructure (e.g. market access)
pollution & depletion (e.g. ecological footprint)
protection (e.g. prioritized conservation area)
disaster (e.g. impact of natural disaster pop effected)

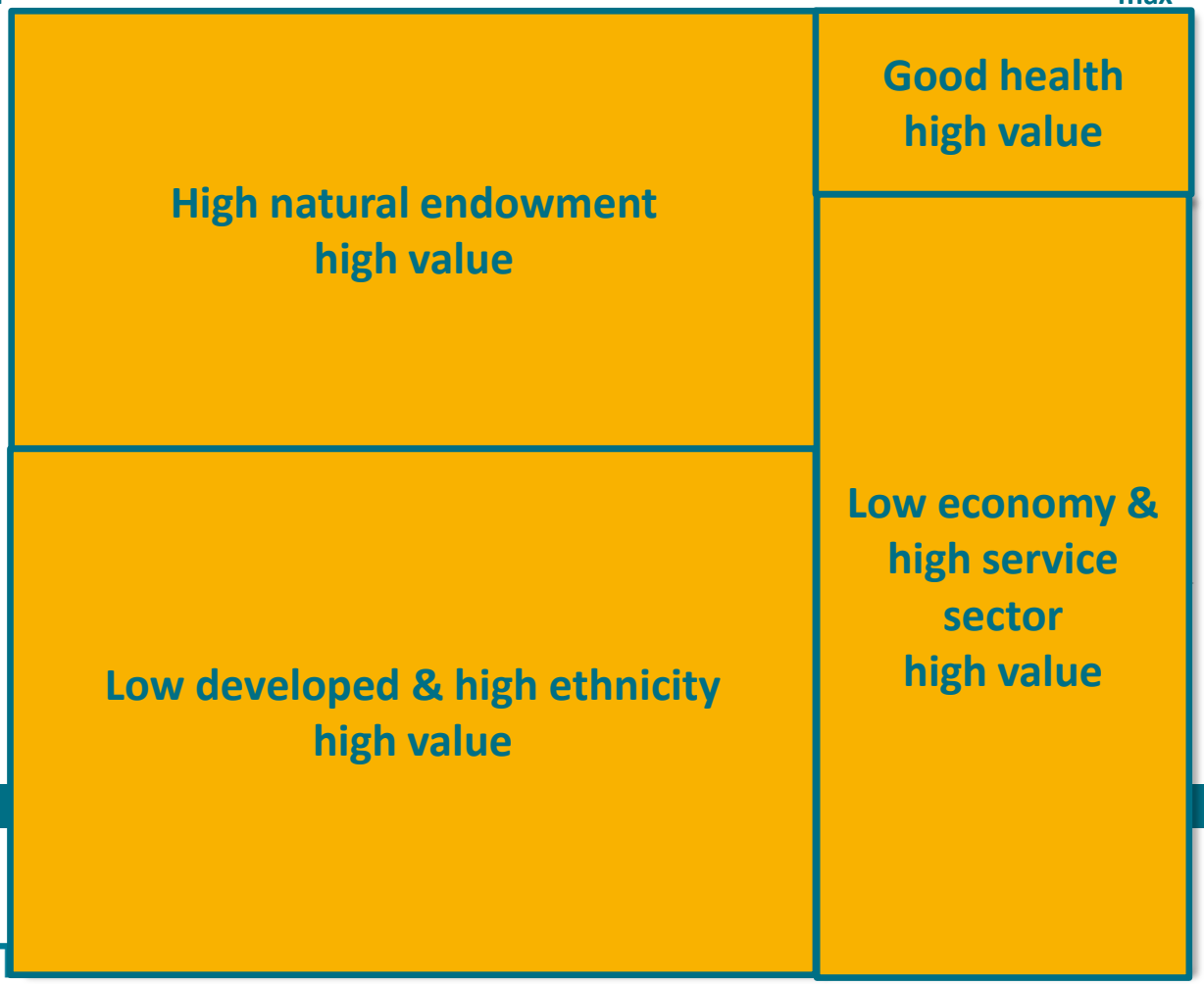
# Results

## Variance of monetary valued ES



# AIC: recreation



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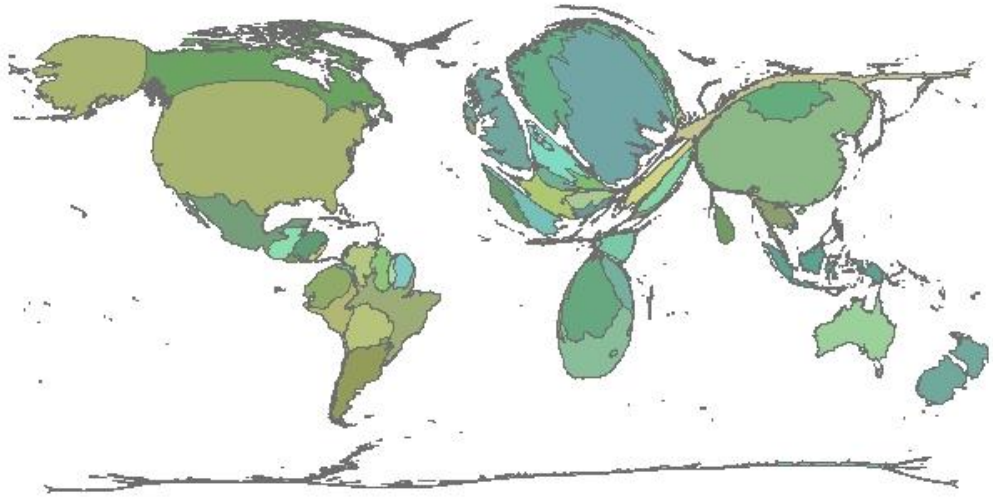
## Next steps

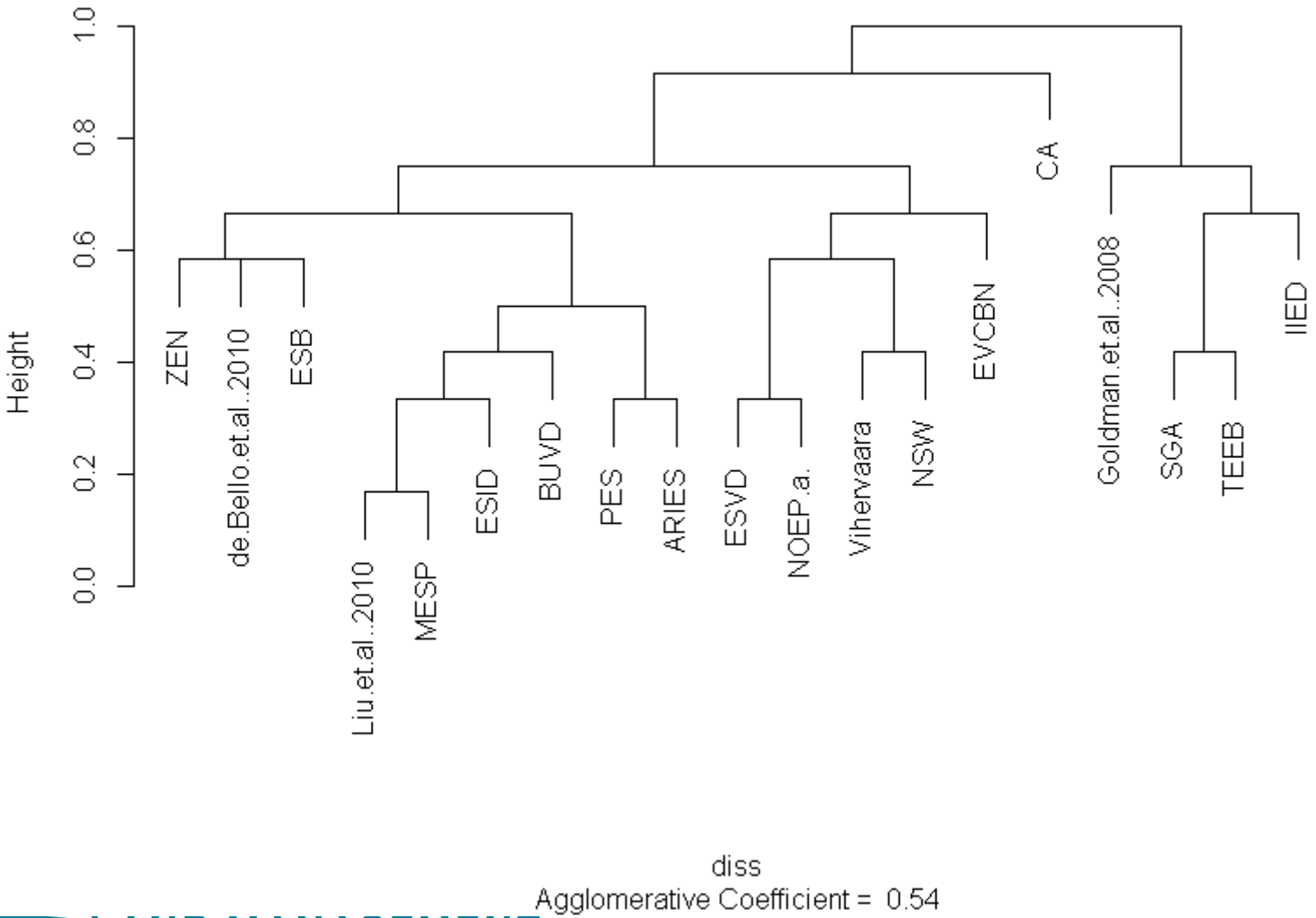
- Further statistical analysis of ES
- Spatial explicit cluster with similarly ecological and socio economic characteristics



- Prediction of ES values in certain regions

# Other synthesis issues

## Thematic cluster of ES databases



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# Thank you!

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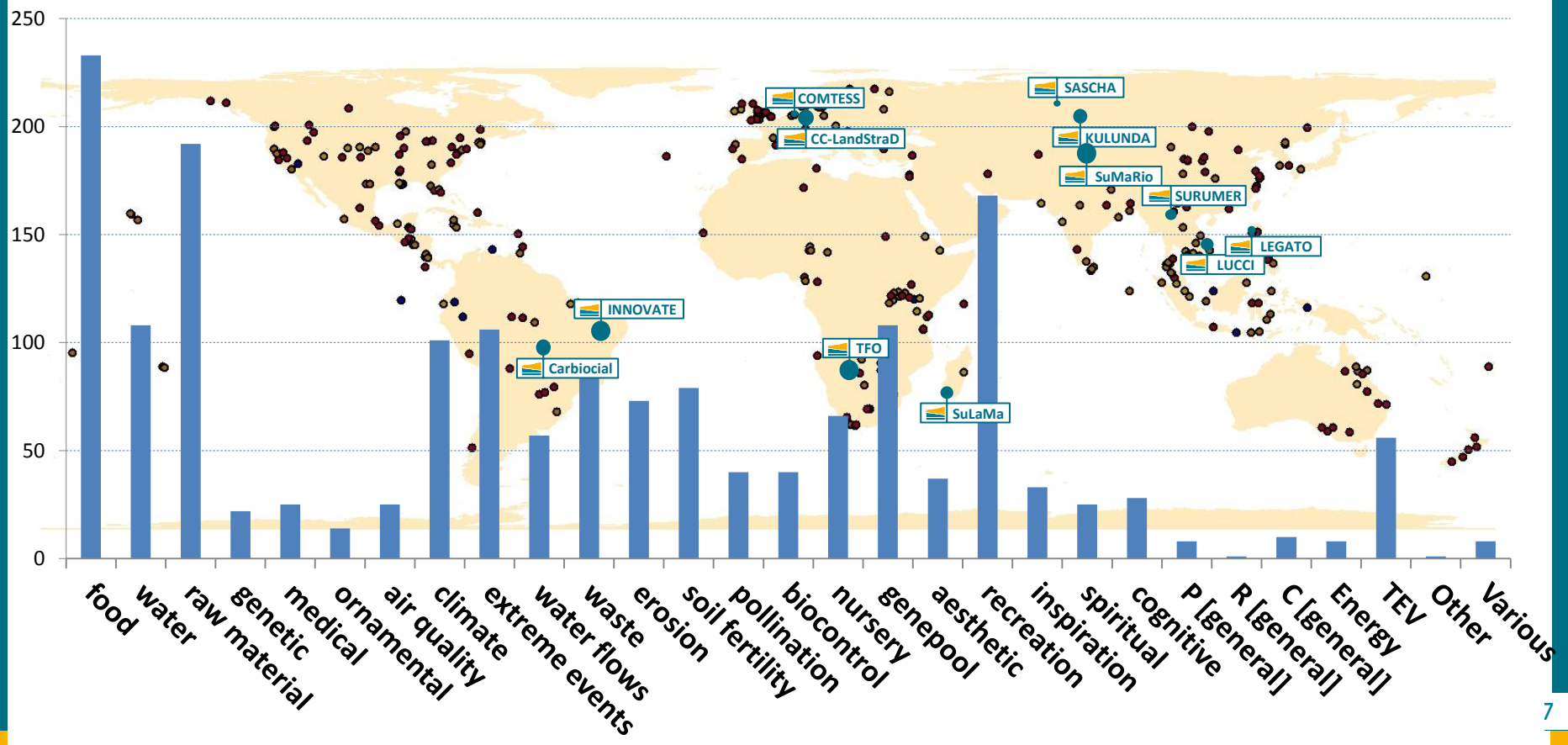
# Case studies of ES

1975-2010



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