UNIVERSITY OF HOHENHEIM

1818

200 YEARS 1818 2018

Public Participation GIS for Ecosystem Services

Welcome!

Բարի գալուստ!

Willkommen!

Bienvenido!

Overview of today‘s session

- Getting to know each other: teaching staff and participants
- Introduction to course outline
- The Millennium Ecosystem Assessment and the concept of ecosystem services (ES)
- Results of the Millennium Ecosystem Assessment and uptake in science, public and policy
- Alternative concepts of human-nature relationships

GAtES Project (2018-2021)

Aim

Advancement and exchange of knowledge on PPGIS for ES, as a means for

- fostering biodiversity conservation and sustainable development, and
- integrating interests and concerns of local stakeholders into biodiversity and ecosystem services conservation.

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Institute of Social Sciences in Agriculture
Chair of Societal Transition and Agriculture

Lecturers for this course

Prof. Dr. Claudia Bieling

forestry, environmental social sciences, land-use systems, landscape management, ecosystem services, resilience, sustainability

Dr. María García-Martín

geography, integrated landscape management, landscape values, participatory methods

Getting to know each other

- Name
- Why did you choose this picture?
- Expectations regarding the course: Why did you sign up for it?

about one to two minutes per person

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Public Participation GIS for Ecosystem Services

Course outline

Working together

- Meetings in class will be a mixture of presentations, group work, discussion and practical exercises.
- This class is planned to be very interactive – so please **contribute actively**!

- **LET US KNOW IF WE ARE PROCEEDING TOO QUICKLY OR TOO SLOWLY!**
- Usually a break of 20 minutes, more if needed.
- Plan in some time during the afternoons (one to two hours, flexible) – we have different tasks for you: reading assignment, conducting interviews,…
- We are available during the afternoons for discussing individual questions.

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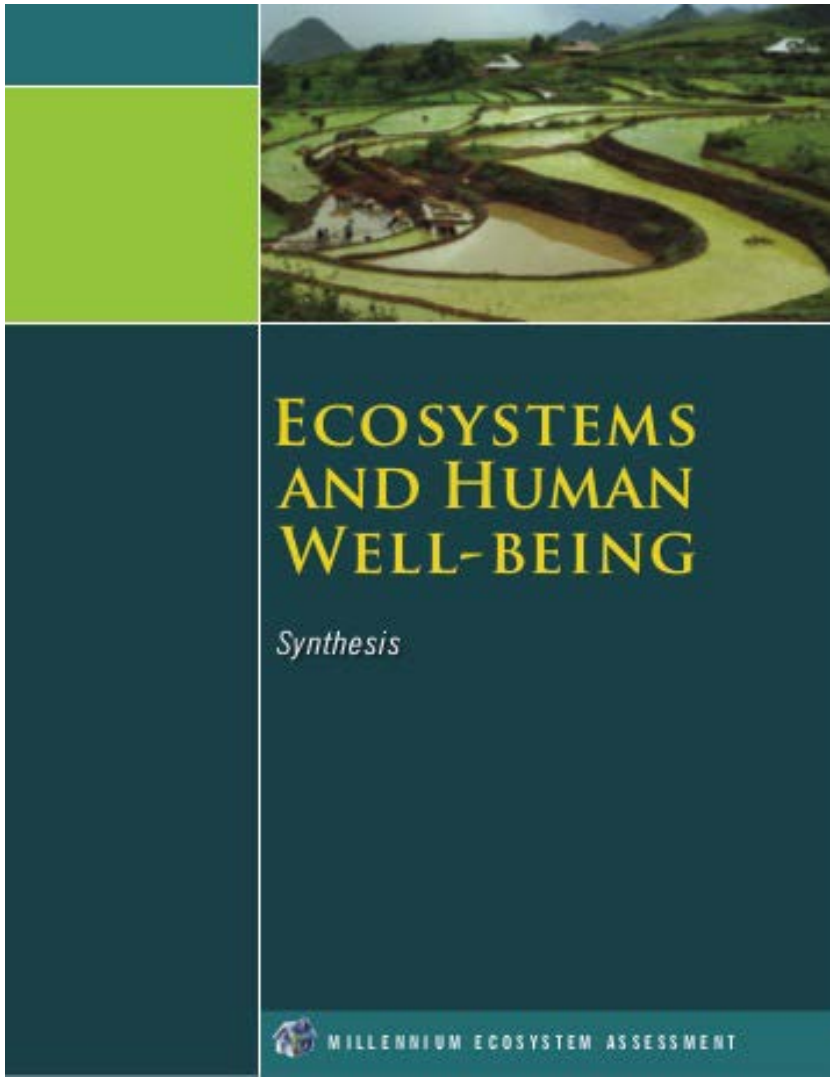
Public Participation GIS for Ecosystem Services

Ecosystem services and human well-being

The Millennium Ecosystem Assessment (2005)

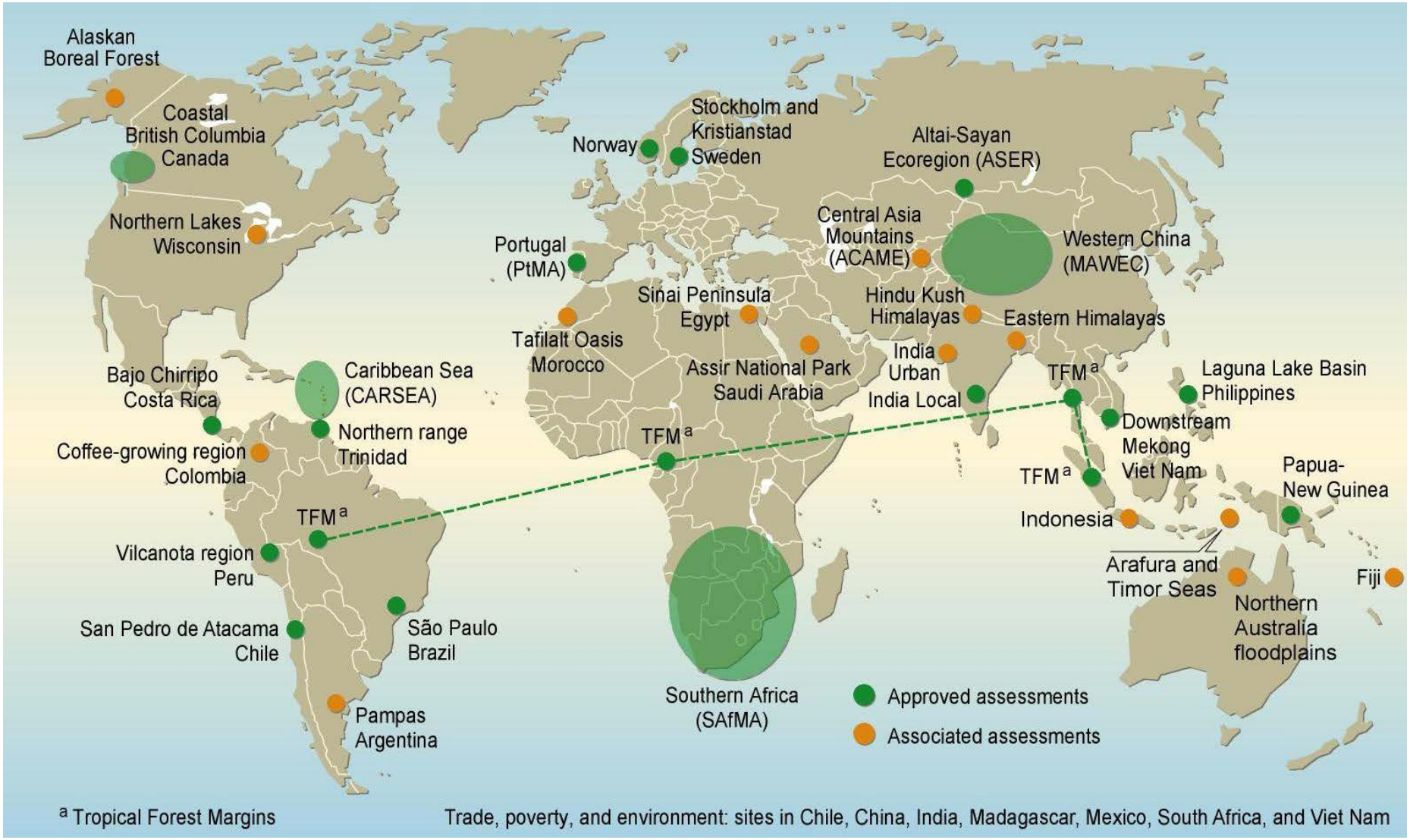
- Global assessment of the consequences of ecosystem change for human well-being, initiated by the United Nations
- Almost 1400 scientists from 95 countries involved
- Focus on interdependencies between ecosystems and human well-being

→ appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably



The Millennium Ecosystem Assessment (2005)

33 sub-global (regional) assessments were carried out



Ecosystem services (ES)

"Ecosystem services are the benefits people obtain from ecosystems."

(Millennium Ecosystem Assessment 2005)

Provisioning services: the goods

Food

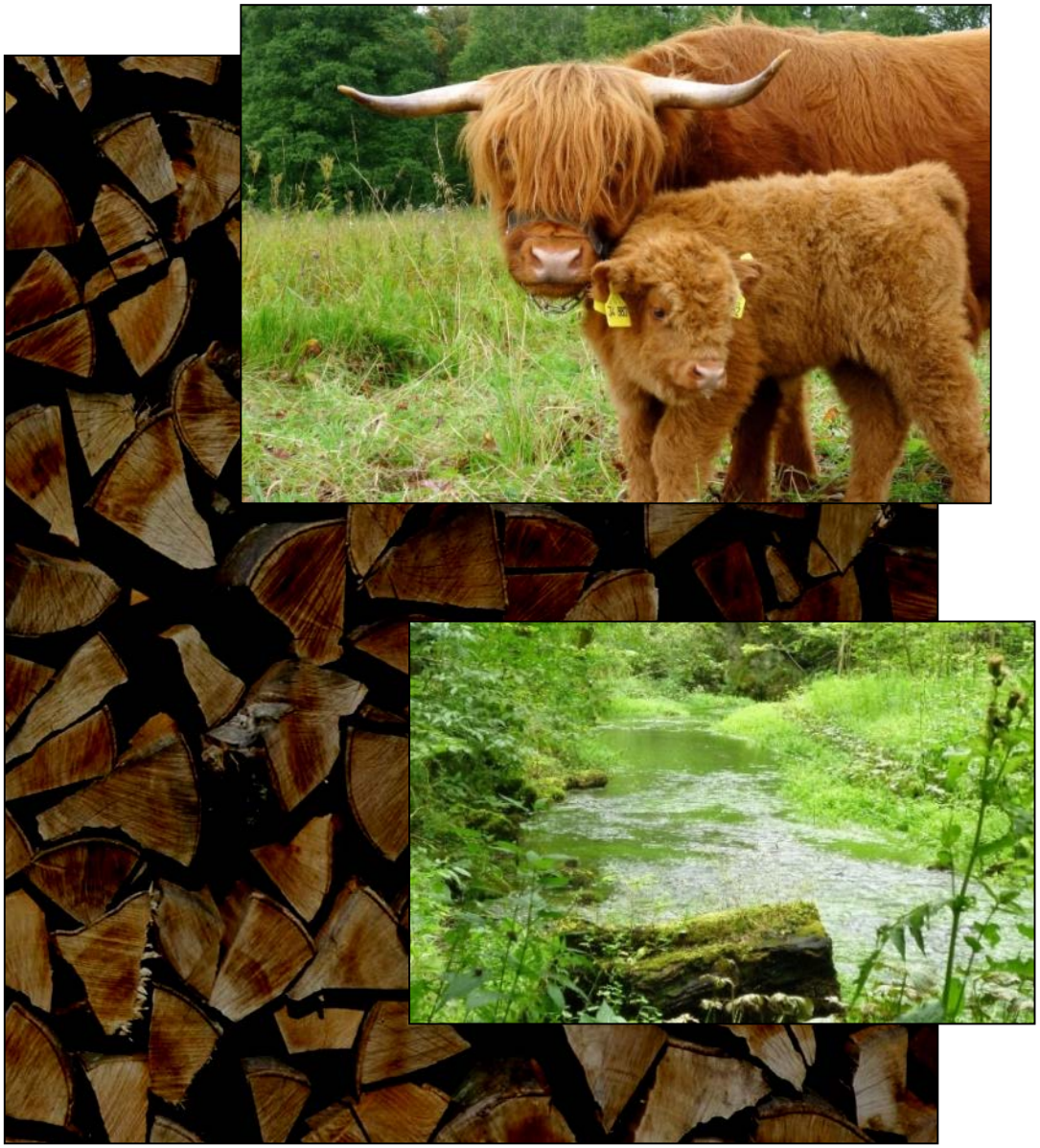
- Crops
- Livestock
- Capture fisheries

Fiber

- Timber
- Cotton
- Energy crops

Fresh water

Genetic resources



Regulating services: the processes

Air quality regulation

Climate regulation/carbon sequestration (global, regional, local)

Water regulation

Water purification

Soil erosion regulation

Natural hazard regulation

Disease regulation

Pollination

Cultural services: the intangible features

Identity

Cultural heritage

Aesthetic values

Inspiration

Spiritual and religious values

Recreation and Tourism

Supporting services: basis for other services

Nutrient cycling

Soil formation

Primary production

Biodiversity as own value and basis for many ecosystem services

Key idea of the ES concept

Integrated perspective, instead of addressing ecosystem services separately

Ecosystem services and human well-being: links

Ecosystem services	
Basic services	Provisioning services
	Regulating services
	Cultural services

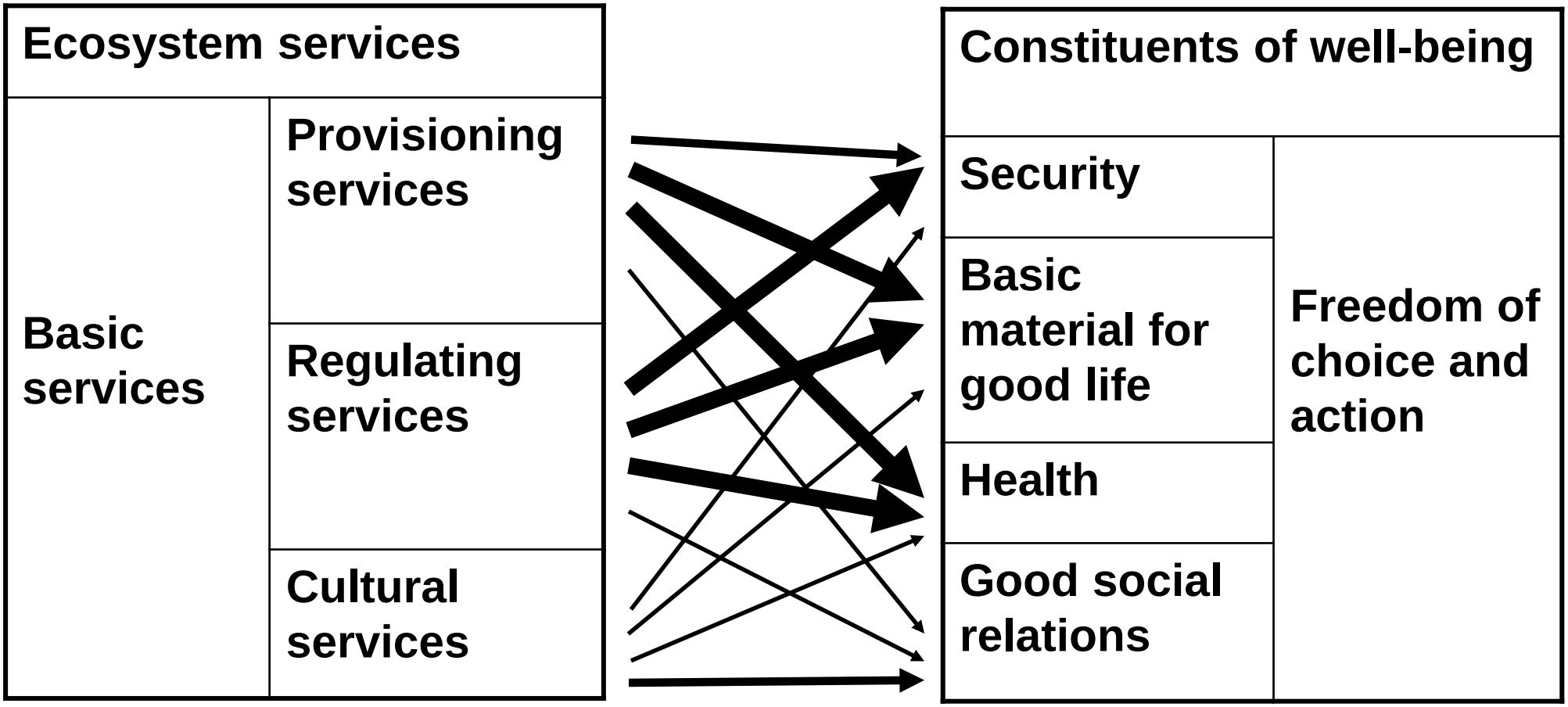
?

Constituents of well-being	
Security	Freedom of choice and action
Basic material for good life	
Health	
Good social relations	

(Millennium Ecosystem Assessment 2005)

1. How strong are the linkages between the different types of ecosystem services and the different constituents of well-being? Examples?
2. Is the relevance of a service depending on the context? Examples?
3. What would happen if a service got lost – could it be replaced/substituted, and if yes, how (technology? money?)? Examples?

Ecosystem services and human well-being: The perspective of the Millennium Assessment



Intensity of linkage:

- weak
- medium
- strong

(Millennium Ecosystem Assessment 2005)

Empirical evidence on the link between ecosystem services and human well-being

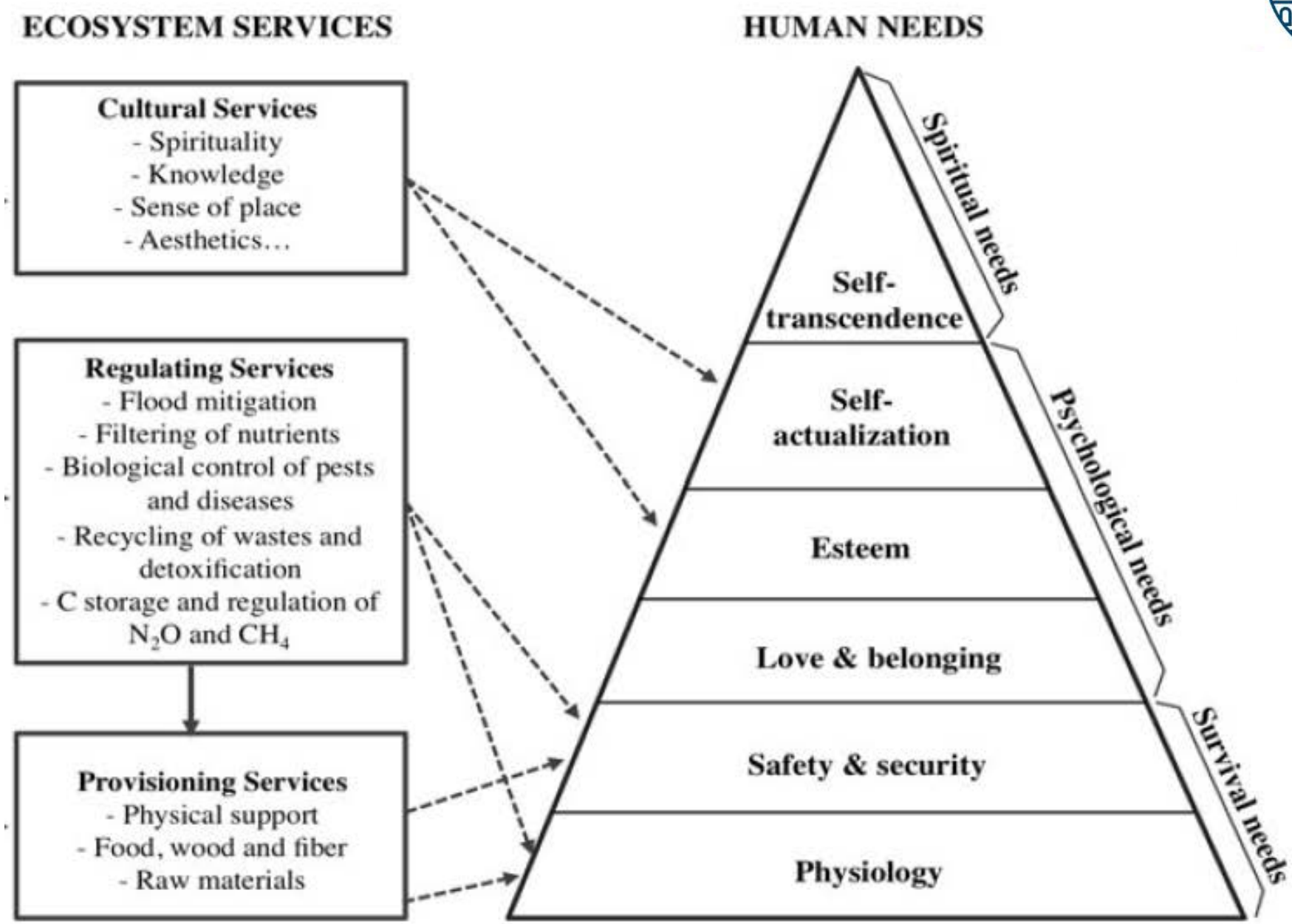
A. Vemuri & R. Costanza (2006):

The role of human, social, built, and natural capital in explaining life satisfaction at the country level: Toward a National Well-Being Index (NWI)

Ecological Economics 58: 119-133

- Investigation on the contributions to life satisfaction of four basic types of capital (human, social, built, and natural) for 171 countries
- The value of ecosystem services per km² is an important factor in explaining life satisfaction at the country level and – together with UN Human Development Index - can explain 72% of the variation in life satisfaction

Ecosystem services in a hierarchy of needs



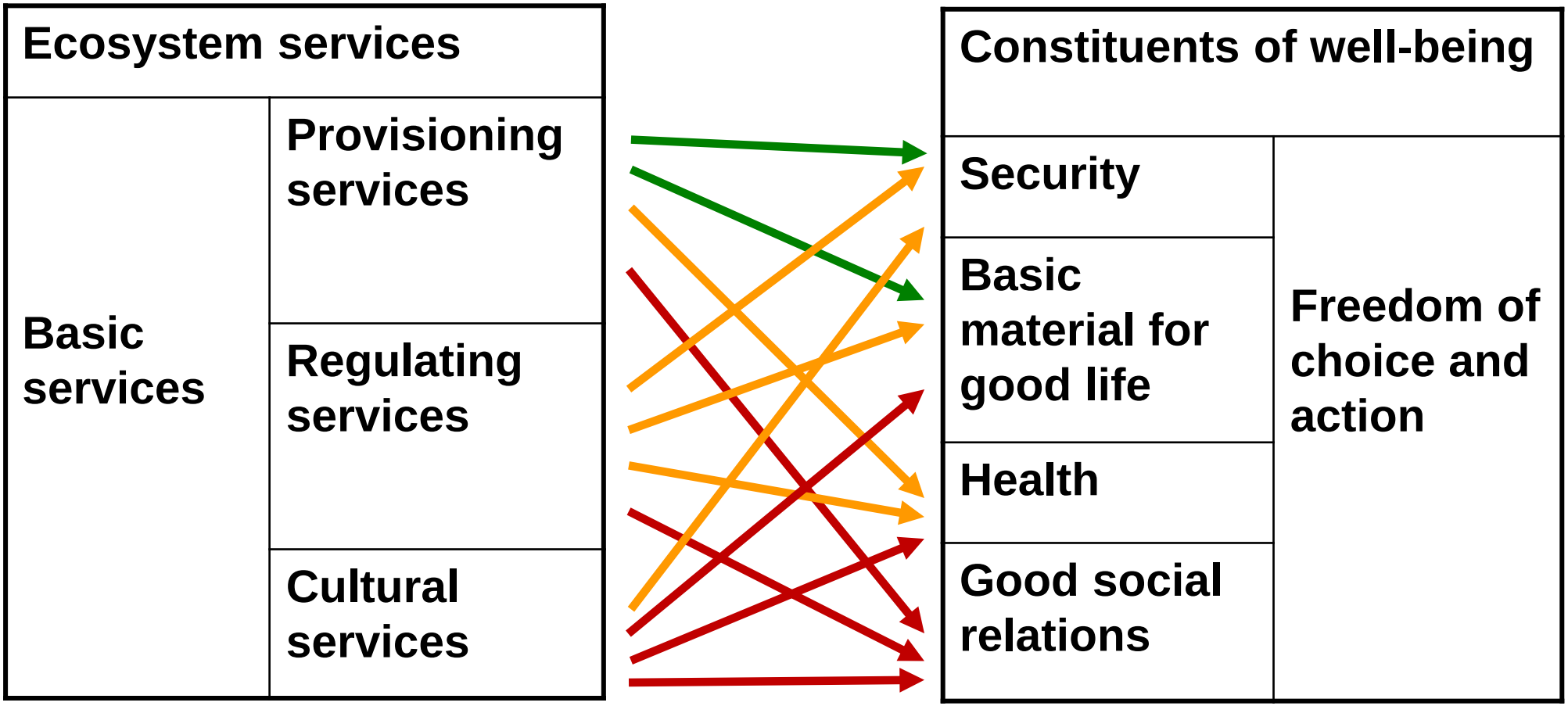
(Wu 2013)

Context-dependency of the relevance of ecosystem services: Empirical evidence

Z. Guo et al. (2010):
Increased dependence of humans on ecosystem services and biodiversity
PLoS ONE 5(10): e13113

- Statistical analysis of national-level data from approx. 150 countries
- Humans become more dependent on ecosystem services in the course of a country‘s economic development, but clear differences:
  - Reduced dependence on provisioning services
  - Increased dependence on regulating and in particular on cultural ecosystem services

Substitutability of ecosystem services: The perspective of the Millennium Assessment



Potential for mediation by socioeconomic factors:

- **low**
- **medium**
- **high**

(Millennium Ecosystem Assessment 2005)

Millennium Ecosystem Assessment: Some results

Approximately 60% (15 out of 24) of the ecosystem services evaluated are being degraded or used unsustainably

Provisioning Services		Status
Food	crops	↑
	livestock	↑
	capture fisheries	↓
	aquaculture	↑
	wild foods	↓
Fiber	timber	+/–
	cotton, silk	+/–
	wood fuel	↓
Genetic resources		↓
Biochemicals, medicines		↓
Fresh water		↓

Regulating Services	
Air quality regulation	↓
Climate regulation (global)	↑
Climate regulation (regional)	↓
Water regulation	+/–
Erosion regulation	↓
Water purification and waste treatment	↓
Pollination	↓
Natural hazard regulation	↓
Cultural Services	
Spiritual and religious values	↓
Aesthetic values	↓
Recreation and ecotourism	+/–

Millennium Ecosystem Assessment: Some results

Economic costs of degradation

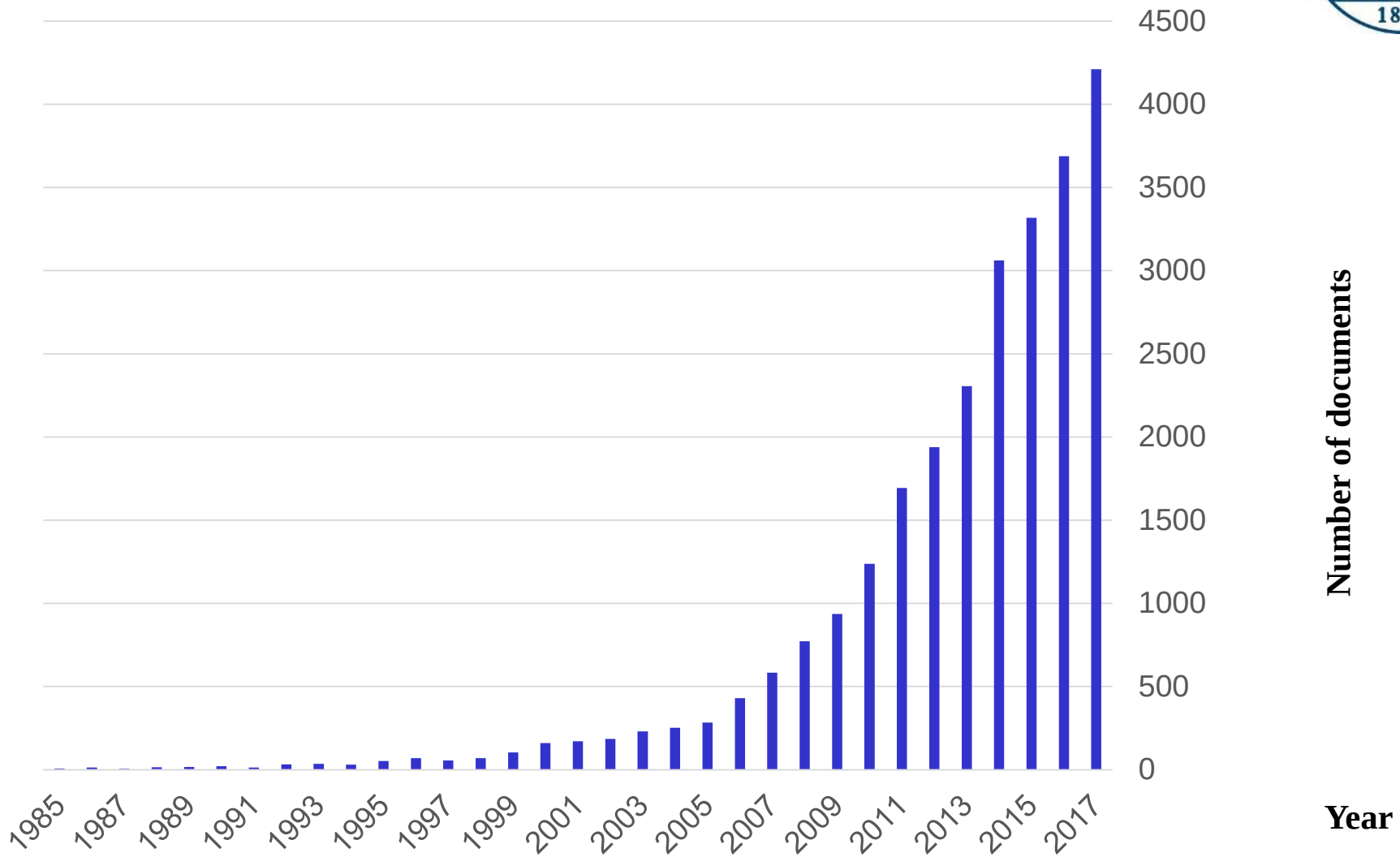
- 1992 – Collapse of Newfoundland cod fishery:
  ~$2 billion (income support, retraining)

- 1996 – External cost of agriculture in the UK:
  $2,6 billion (9% of yearly gross farm receipts)

- 2003 – Extreme events (floods, fires):
  ~$70 billion

→ **contributed to the idea of investing in the conservation of ES**

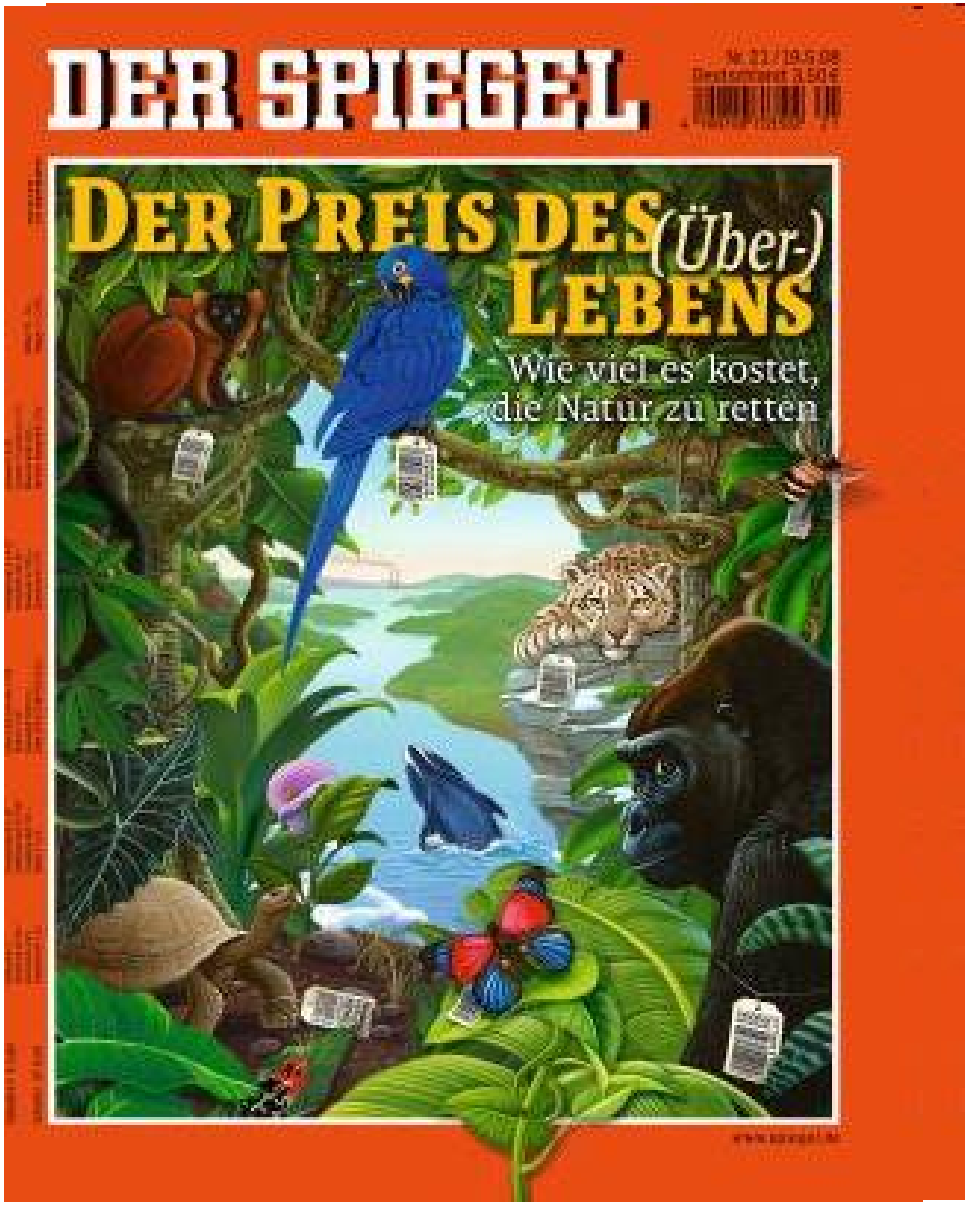
Uptake of the ecosystem services approach in science



Search results for the term ”ecosystem services” in keyword, title, abstract of publications listed in the Scopus database (as of June 2017, numbers for 2018 not included)

Role of the ecosystem services approach in the public

- Raising of societal awareness of the value of ecosystems and nature
- New financing mechanisms for biodiversity and landscape conservation
- Support in decision-making (land-use conflicts, landscape planning…)
- …



Uptake of ES at the science-policy-practice interface

www.ipbes.net

http://www.es-partnership.org

Uptake of ES in policies

EU policies and initiatives addressing ES:

- EU Biodiversity Strategy to 2020
- EC Green Infrastructure Strategy 2013
- Water Framework Directive
- Common Agricultural Policy
- Cohesion Policy
- Mapping and Assessment of Ecosystems and their Services (MAES)
- ...

Increasing uptake in national or regional policies

Example: The EU Biodiversity Strategy to 2020

„Biodiversity is our natural capital, delivering ecosystem services that underpin our economy. Its deterioration and loss jeopardises the provision of these services: we lose species and habitats and the wealth and employment we derive from nature, and endanger our own wellbeing.“

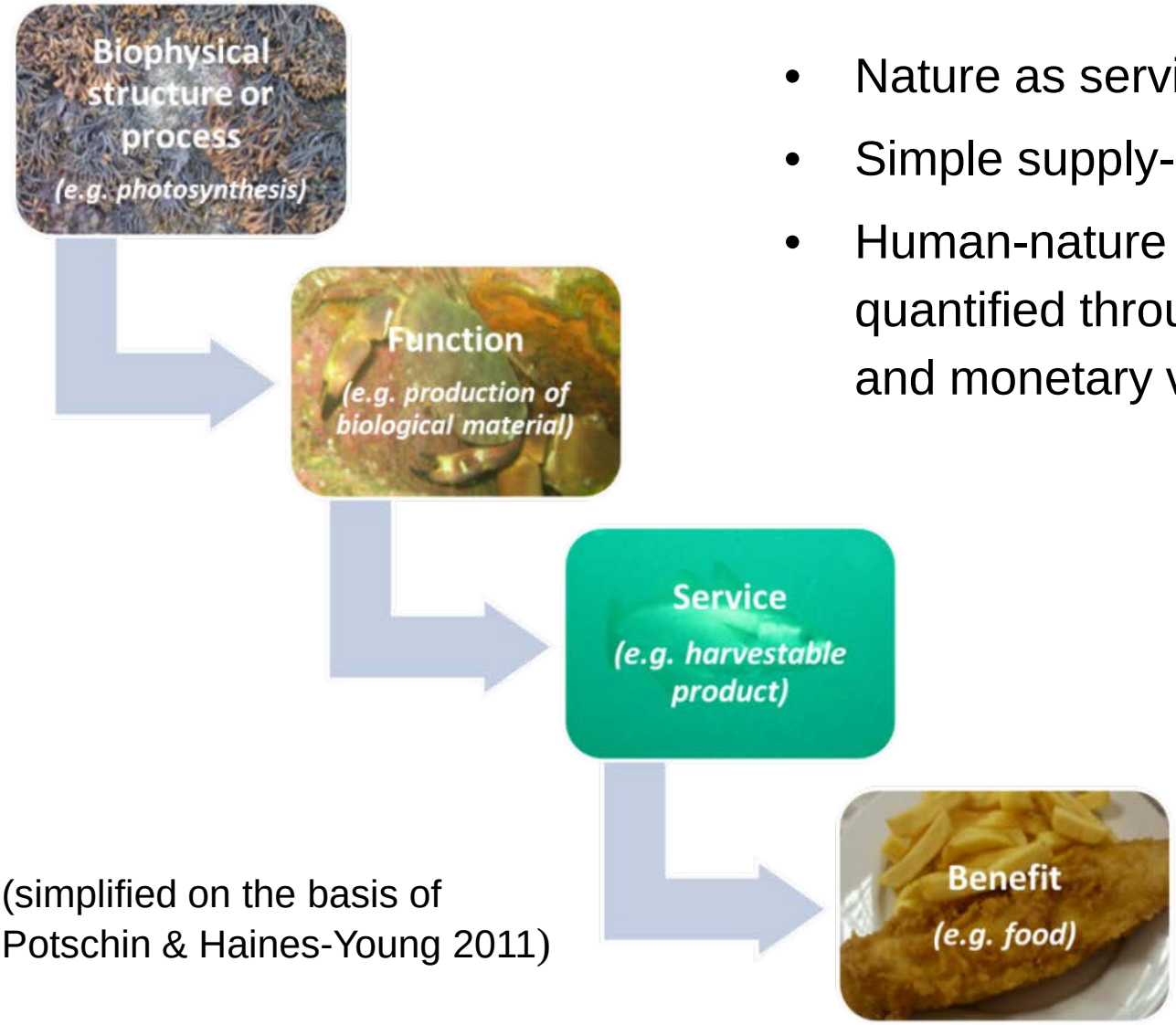
Example: The EU Biodiversity Strategy to 2020

„Biodiversity is our natural capital, delivering ecosystem services that underpin our economy. Its deterioration and loss jeopardises the provision of these services: we lose species and habitats and the wealth and employment we derive from nature, and endanger our own wellbeing.“

→ What are the **strengths** of this approach towards nature conservation?

→ What are its **limitations/problems**?

What perception(s) of nature do you read from the ecosystem services approach?



(simplified on the basis of Potschin & Haines-Young 2011)

- Nature as service provider
- Simple supply-demand relationship
- Human-nature relationship can be quantified through bio-economic modeling and monetary valuation

Alternative concepts of human-nature-relations: Exemplary statement

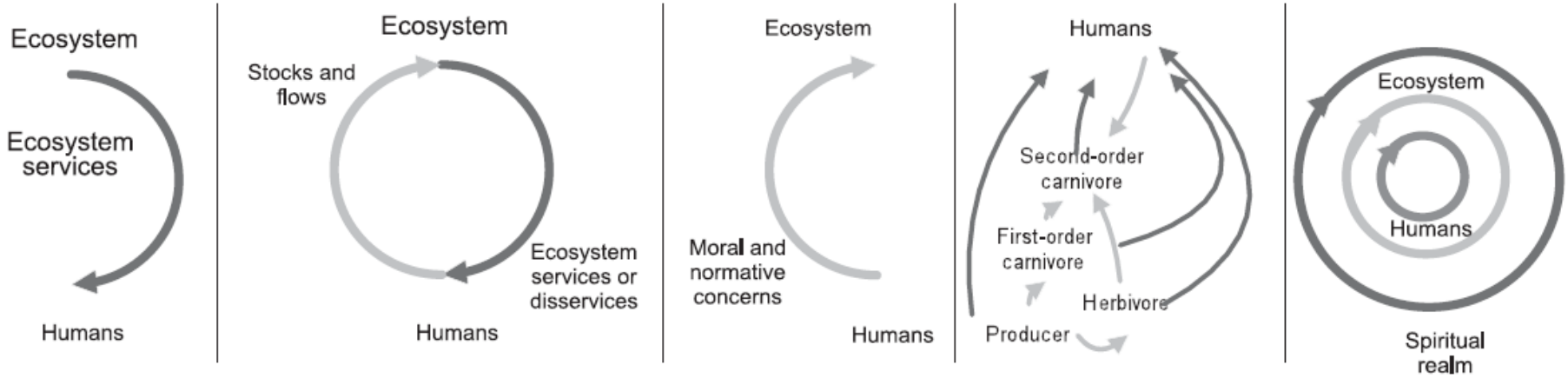
„…that the origin of the living things of this world are our ancient relatives and that they must be treated with respect, and… the islands, the salmon, and the living things can be called upon for help to survive in this life.“

Tsawout First Nation community on Vancouver Island, Canada

(cited after Raymond et al. 2013)

Multiple metaphors of human-nature relationships

	Economic production	Closed-loop production	Stewardship	Web of life	Ecocultural community
Ecosystem management ethic	Humans have a right or entitlement to use ecosystem services as long as they can pay for them	Humans have a right or entitlement to use ecosystem services as long as they can be used sustainably or properly substituted by equivalent natural or humanmade services	Humans' moral concerns drive the protection of ecosystem services	Humans are one part of a wider ecological system and have a responsibility to understand the impacts on the various components of the broader system	Humans have a responsibility to manage ecosystems on the basis of the connections among the spiritual, physical, and social worlds
Indicators of success	Economic worth of ecosystem services to humans	Balanced delivery of ecosystem services and improved well-being of people and nature	Extent to which moral concerns about nature are considered in ecosystem management	Species interactions; levels of ecosystem function	Integrity of the connections among spiritual, physical, and social worlds



(Raymond et al. 2013)

Multiple metaphors of human-nature relationships: Ecocultural community, Taswout First Nation on Vancouver Island

- About 1000 people, heavily relying on salmon and other marine life for their sustenance (sustainable reef-net fishing)
- Entire area plays an integral role in Tsawout economic, social and spiritual life
- Belief system of kinship and responsibility to land and resources, based on inextricable relationship and oneness between humans and all other entities of the environment

http://www.vancouverobserver.com

- Reflected in management actions, e.g. successful opposition to outside development of the area, establishment of the Tsawout Land Stewardship Society

(example taken from Raymond et al. 2013)

Multiple metaphors of human-nature relationships: Economic production Panama Canal watershed

- Hot spot of global commerce, providing important revenues to the country
- Technocratic and engineered control over nature which is understood as delivering critical services (reduce siltation, increase water flow in dry season)

https://micanaldepanama.com/ampliacion/

- Establishment of payment schemes for ecosystem services, e.g. ForestRe with 25-year bonds that pay for the reforestation of the slopes of the Panama Canal

(example taken from Raymond et al. 2013)

Contestation around the ecosystem services approach

- Anthropocentric focus or beyond instrumental values?
- Promoting exploitation or reconnecting society and nature?
- Conflicting with biodiversity conservation or complementarity?
- Supposed focus on economic valuation or multiple values?
- …

(Schröter et al. 2014)

→ **It all very much depends on how we use the ES approach!**

Today‘s session in a nutshell

- Ecosystems are linked to human well-being in manifold ways, which is captured in the ecosystem services concept.
- ES are a vibrant field of research, have found their way into public debates and receive high policy interest – they are most central in current policy and management strategies.
- However, ES are only one of several approaches to conceptualizing human-nature-relationships and come with potentials and challenges.

Homework

Ecological Economics 69 (2010) 1228–1236

Contents lists available at ScienceDirect

Ecological Economics

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

Payments for ecosystem services as commodity fetishism ☆

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References

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