NATURAL ENVIRONMENT CENTRE

National ecosystem service indicator framework to enhance efforts towards sustainable planning

Laura Mononen, Ari-Pekka Auvinen,
Anni Ahokumpu, Petteri Vihervaara
Finnish Environment Institute

Systems Ecological Perspectives on Sustainability
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www.biodiversity.fi/en/ecosystem-services

Services by category

- Provisioning services
- Regulating services
- Cultural services

Introduction

Which natural processes are crucial for the Finnish economy and culture? How do they affect are our lives? Are we letting these life-supporting services operate without disturbance?

Work on the Finnish ecosystem service indicators begun at the Finnish Environment Institute in 2013. The aim of the work has been to concretize the concept of ecosystem services from a national perspective and to provide a list of the most important ecosystem services in Finland.

At the moment, there are 10 provisioning services, 12 regulating services and 6 cultural services in the collection. These are based on the International Common International Classification of Ecosystem Services (CICES) and have been selected by multi-sectoral expert groups after initial editing by the working group at Finnish Environment Institute.

On each ecosystem service we have provided four indicators based on the Cascade model: on the ecosystem structure (1) and functioning (2) that is crucial for the provisioning of the service as well as the benefit (3) that we humans derive from the service as well as its value (4) to us.

Work on measuring and monitoring ecosystem services is far from complete. Partly this is because of the vastness of the subject, partly because of scattered and slowly developing information sources. In many cases, we cannot provide you with the exact numerical monitoring data that we would wish to. In these cases we have tried to explain the relevant phenomenona in words.

Especially as this is a work-in-progress indicator collection, all feedback is most welcome.

Enjoy your stay at the Finnish ecosystem indicator collection at Biodiversity.fi!

Working group:
Petteri Vihervaara, Senior Research Scientist, project leader
Anna-Liisa Ahokumpu, Researcher
Ari-Pekka Auvinen, Researcher
Laura Mononen, Researcher

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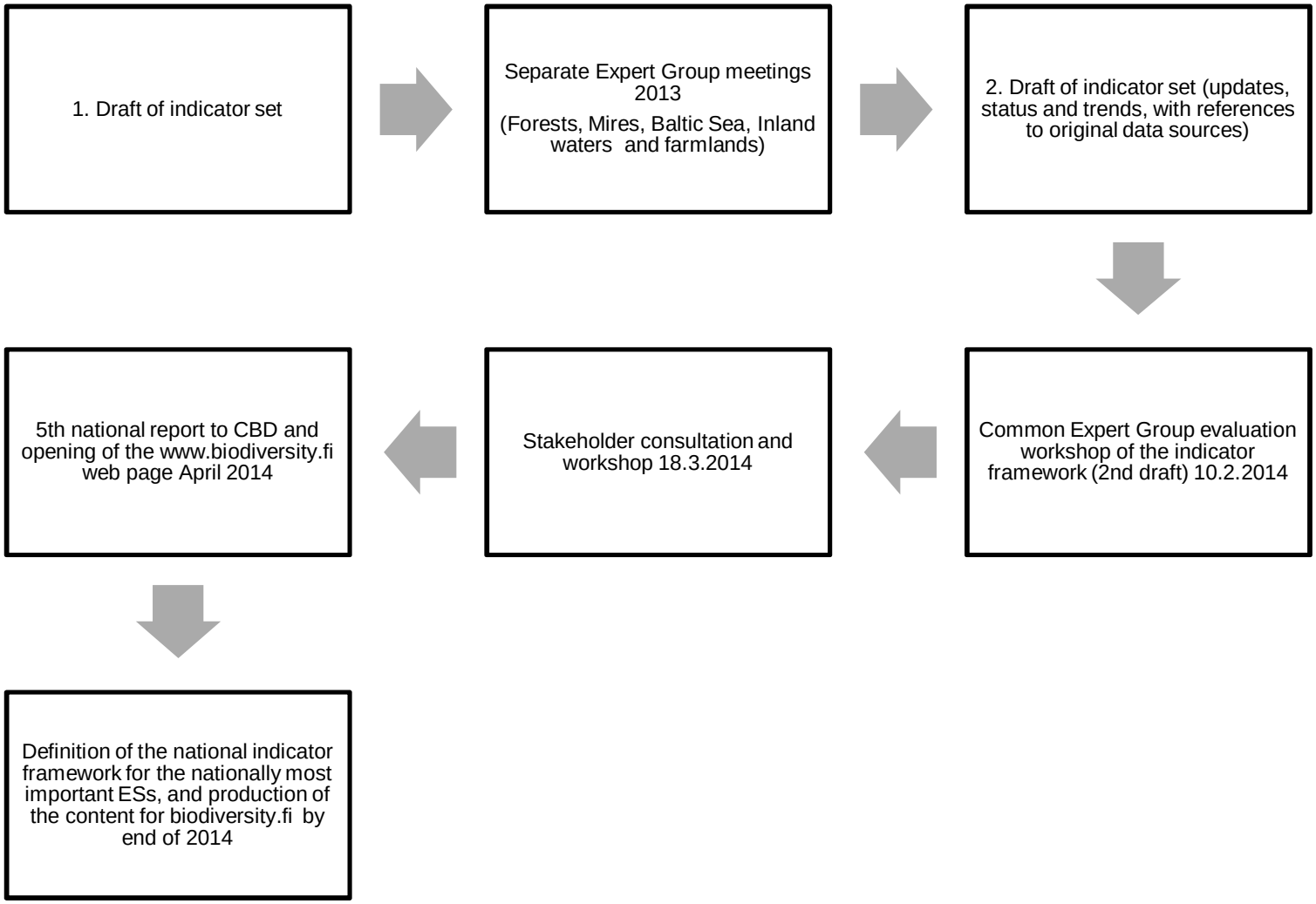
Process of choosing the 28 most important ecosystem services in Finland and definition of indicators



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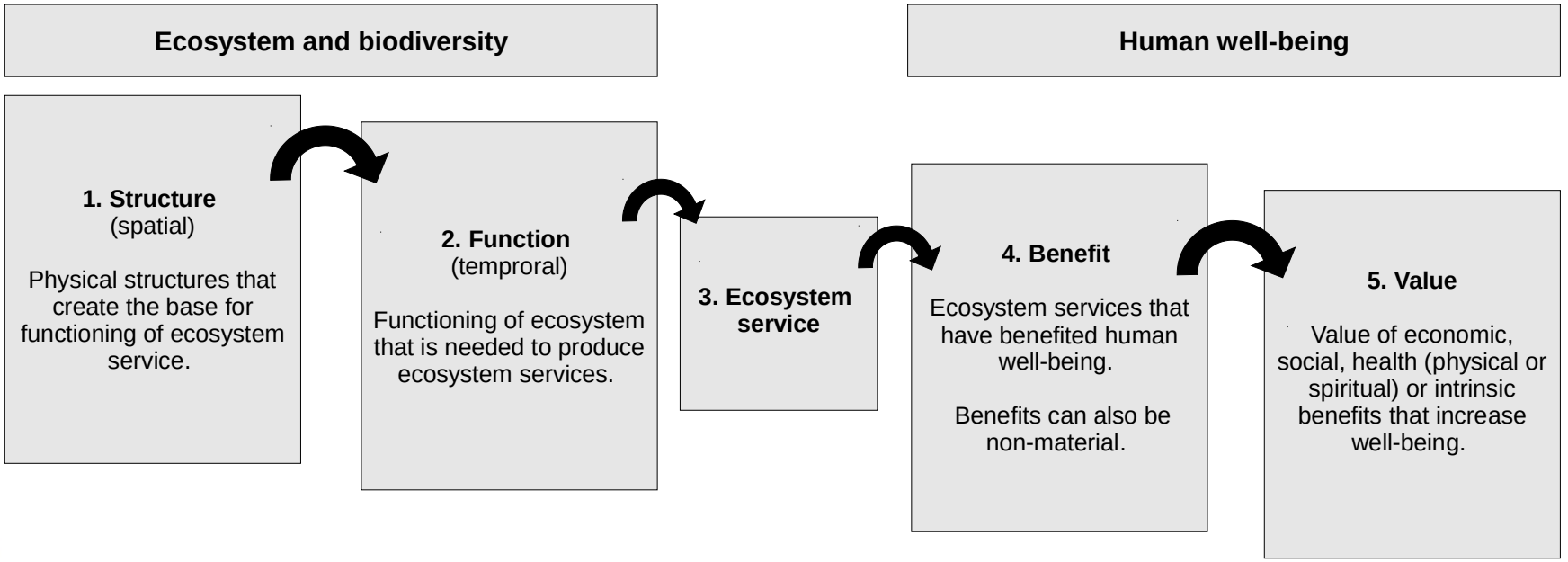
Following the cascade model to define ES indicators



Modified from Haines-Young & Potschin 2010

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Provisioning services

Structure:
Required habitat (ha) and/or organisms (n)

Function:
Productivity, inputs from outside the ecosystem (feeding, fertilizers, management etc.)

Benefit:
Utilized share of total yield

Value:
Economic, social, health and intrinsic

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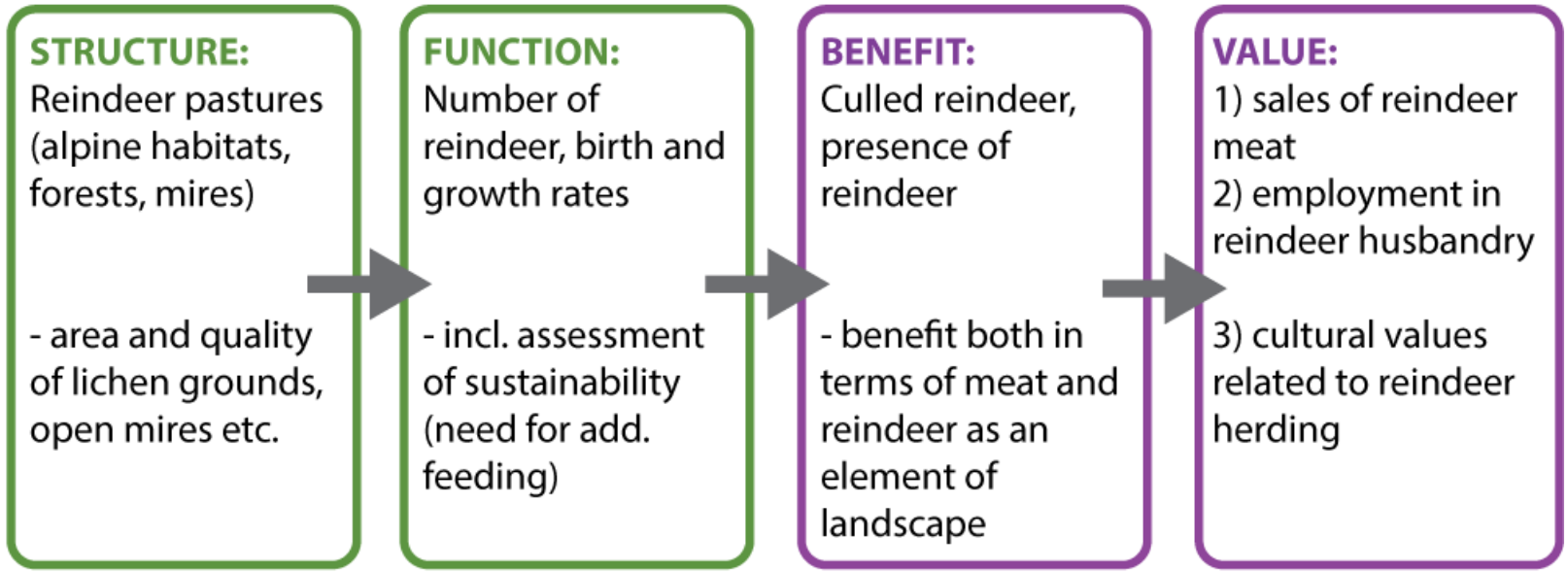
Ecosystem service: REINDEER



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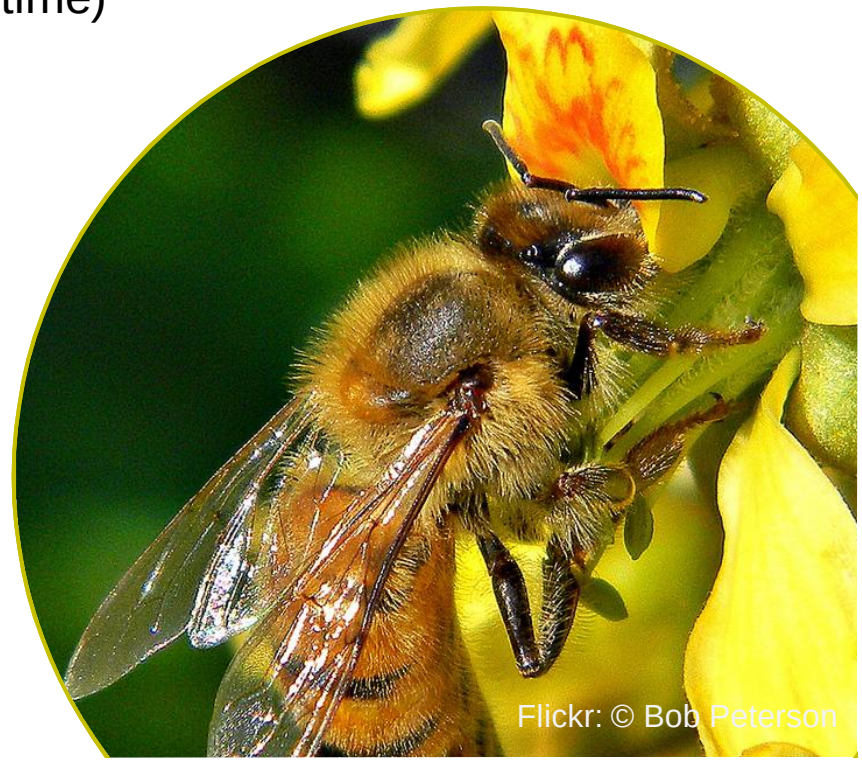
Regulating and maintenance services

Structure:
Habitat qualities required, area of suitable habitat, required species assemblage

Function:
Functioning of the process (unit/area/time)

Benefit: Improvement of quality

Value:
Most often avoided costs
(that arise from compensating for the compromised functioning of the service)



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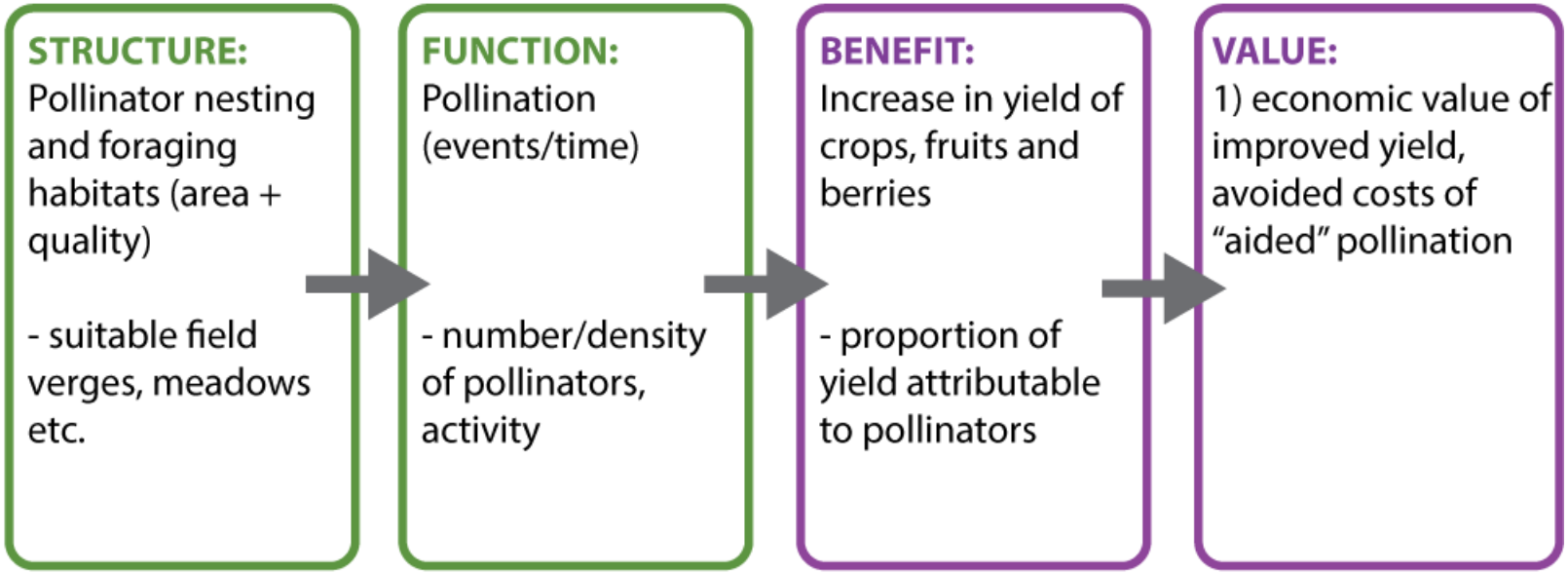
Ecosystem service: POLLINATION



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Cultural services

Structure:
Quality as experienced by people, accessibility

Function:
Change/continuity as experienced by people (considering time scale)

Benefit:
Measured as number of visits, times used, number of work(s) produced etc.

Value:
Economic, social, health and intrinsic values

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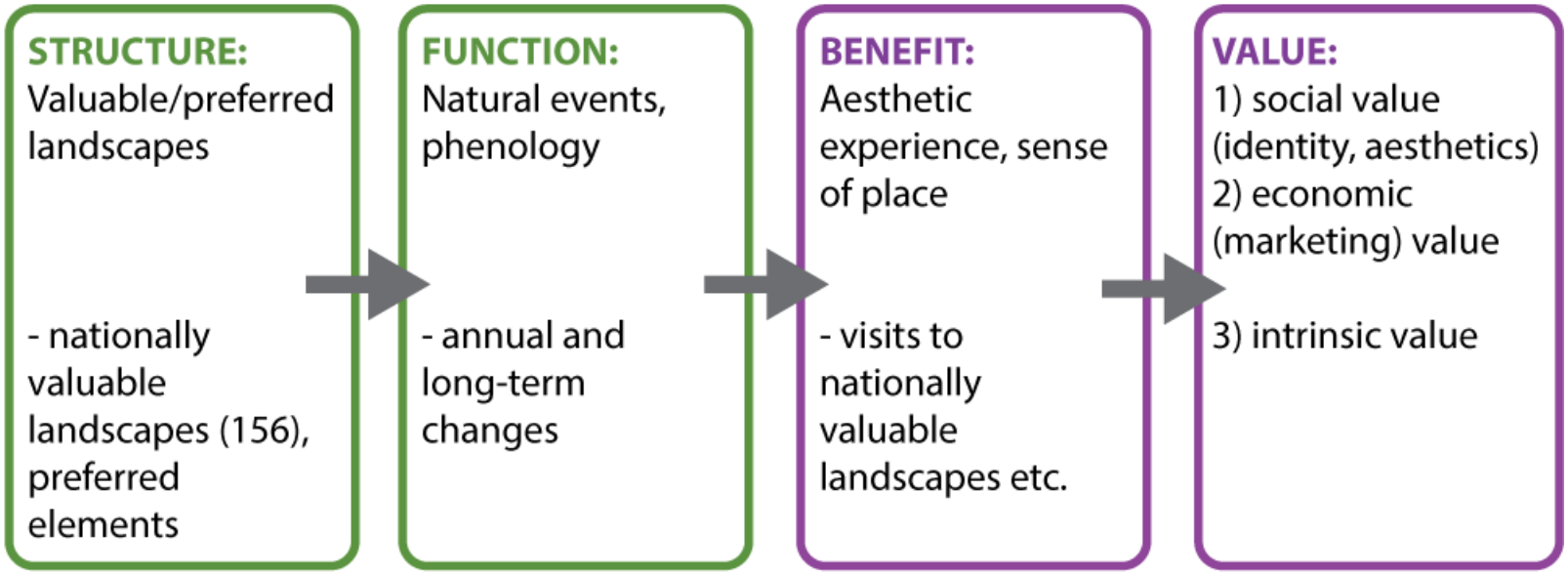
Ecosystem service: LANDSCAPE



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Laura.Mononen@ymparisto.fi

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PROVISIONING SERVICES	1. Structure	2. Function	4. Benefit	5. Value
Berries and mushrooms	Berry and mushroom habitats (forests, mires)	Average annual yield (total kg/A or kg/ha/A)	Harvested yield (harvest entering markets + domestic use)	Sales of berries and mushrooms, value of domestic use, health impacts of the use of berries and mushrooms
Game	Game habitats (forests, mires, farmlands, alpine habitats)	Game population, reproduction rate, wildlife richness	Game bag	Economic value of game bag, social, health values and intrinsic cultural values related to hunting
Reindeer	Reindeer pastures (alpine habitats, forests, mires)	Number of reindeer, birth rate, additional feeding	Culled reindeer	Sales of reindeer meat, employment in reindeer husbandry, intrinsic cultural values related to reindeer herding
Wood	Managed forests (forests, mires)	Growing stock increment, effect of management	Roundwood removals	Economic value of roundwood trade, employment in forestry
Clean water	Aquifers, pristine mires and other wetlands, undisturbed soils (forests, mires, inland waters, farmlands, urban areas)	State of surface water and groundwater, capacity to clean water	Use of raw water	Economic value of domestic, irrigation and process use, health impacts of clean water, social values related to the availability of clean water
Bioenergy	Types of forest used for bioenergy harvesting, area under bioenergy crops (forests, mires, farmlands)	Annual growth of biomass, sustainability of biomass harvesting (stumps, cutting residue)	Harvest, energy content	Value of produced energy, employment
Fish and crayfish	State of surface waters , stream connectivity (Baltic Sea, inland waters)	Population dynamics of commercially used fish and crayfish	Total catch (commercial and domestic)	Value of commercial and domestic/recreational catch, employment, health impacts of the use of fish and crayfish, intrinsic cultural values related to fishing
Crops	Area under crop cultivation (farmlands)	Nutrient dynamics, yield per ha, use of fertilizers and pesticides (organic vs. conventional)	Harvested yield	Agricultural income, employment, values related to agricultural landscapes
Reared animals	Number of animals, area of pastures	Nutrient and energy uptake, productivity (organic vs. conventional)	Animal products	Agricultural income, employment, values related to agricultural landscapes
Genetic material	Number of varieties	Genetic variance, evolution	Breeding and discovery potential, benefit gained from utilising genetic variance thus far(increased yield per ha etc.)	Intrinsic value of genetic variance and evolution, economic value of modified organisms

REGULATING AND MAINTENANCE SERVICES	1. Structure	2. Function	4. Benefit	5. Value
Water retention	Undrained habitats, vegetation type and cover (forest, mires, inland waters, farmlands, urban areas)	Detention time (per habitat type, natural vs. modified)	Flow control (natural levelling of flow)	Avoided costs of flood prevention and damage repair
Water filtration	Undisturbed habitats, vegetation type and cover, aquifers (forest, mires, inland waters, farmlands)	Groundwater production (recharge rate, mm/ha/A)	Groundwater and surface water quality	Health impacts, economic value of groundwater stock and high quality surface water
Climate regulation	Carbon-storing habitats (forest, mires, Baltic Sea, inland waters)	Carbon balance, sequestration rate	Climate regulation, stable climate	Avoided costs of negative climate impacts, intrinsic value of stable climate
Nitrogen uptake	Nitrogen-fixing vegetation (forests, farmlands)	Nitrogen fixation rate	Improvement of nutrient balance and soil quality	Avoided costs of fertiliser use
Erosion control	Vegetation type and cover: nontilled farmland, undrained habitats, unprepared forest soils (forests, mires, farmlands)	Particle retention rate	Avoided erosion, improved water quality	Avoided costs of fertilizer use, economic value of high quality surface water
Soil quality	Functional diversity of soil organisms (farmlands)	Cycling of substances	Soil quality	Avoided costs of soil improvement, economic value of increased harvest
Nutrient retention	Vegetation type and cover: nontilled farmland, buffer strips, undrained habitats, unprepared forest soils (forests, mires, farmlands)	Nutrient retention rate	Improved water and soil quality	Economic, social, health and intrinsic value of clean water, avoided costs of fertilizer use and water protection measures
Mediation of waste and toxins	Ecosystem, soil organisms	Decomposition, mediation or storage of waste by biological, biochemical or biophysical processes	Improvement of water and soil quality	Economic, social, health and intrinsic value of clean soil and water, avoided costs of waste management
Nursery habitats	Area and state of nursery habitats (Bladderwrack communities, mire edges etc.)	Shelter and nutrition (measured as reproduction success)	Viable populations	Avoided costs of stock replenishment and other management measures
Pollination	Pollinator nesting and foraging habitats (area + quality)	Pollination	Increase in yield	Economic value of improved yield
Air quality	Urban green infrastructure	Retention of small particles	Improved air quality	Health values of clean air, avoided medical costs
Noise reduction	Vegetation in urban areas	Acoustic absorption	Reduced noise level	Health values of reduced-noise environment, avoided medical costs

CULTURAL SERVICES	1. Structure	2. Function	3. Benefit	4. Value
Recreation	Preferred natural areas, accessibility	Natural events, phenology	Recreation, experience	Health (icl. avoided medical costs, economic values (invested time etc.), social values
Nature-based tourism	Preferred natural areas, accessibility	Natural events, phenology	Employment, recreation, experience	Tourism revenue, employment
Nature-related heritage	Cultural heritage in natural landscapes	Natural events, phenology	Cultural continuity	Social values, intrinsic value
Landscape	Valuable/preferred landscapes	Natural events, phenology	Aesthetic experience	Social value (identity, aesthetics), economic value (marketing value), intrinsic value
Arts and popular culture	Emblematic species and landscapes	Natural events, phenology	Aesthetic experience, recreation	Social value (identity, aesthetics), economic value (marketing value), intrinsic value
Science and education	Areas of particular interest	Natural events, phenology	Source of knowledge	Social value (knowledge, sustainability), intrinsic value, economic value (innovation), health