



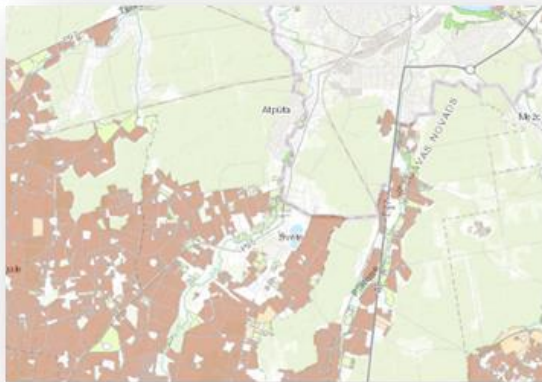
Introduction to green infrastructure planning



Anda Ruskule
Baltic Environmental Forum-Latvia (PP2)
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ENGRAVE

The project aims to enhance river-based green infrastructure by integrating ecosystem and landscape concepts in to the planning and integrated management of the lowland rivers at local and regional scale.



Content

- Definition of Green Infrastructure (GI)
- History of GI concept development: Baltic examples
- New aspect in GI concept: Ecosystem services
- New approaches in GI mapping
- Nature-based solutions (NBS)
- Interrelation between landscape planning, GI & NBS
- Proposal how to address landscape and GI planning in the ENGRAWE project



EU Policy context

- **The EU Biodiversity Strategy's target 2** requires that "by 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems."
- **The action 6 of the Strategy** is setting priorities to restore and promote the use of green infrastructure,
- **EU-wide strategy promoting investments in green infrastructure**, adopted by EC in 2013



What is Green Infrastructure (GI)?

The EU Green Infrastructure Strategy (EC, 2013)

"Strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas."



Source: European Commission (2013). Green infrastructure (GI) – Enhancing Europe's Natural Capital. COM(2013)249.

What is Green Infrastructure (GI)?



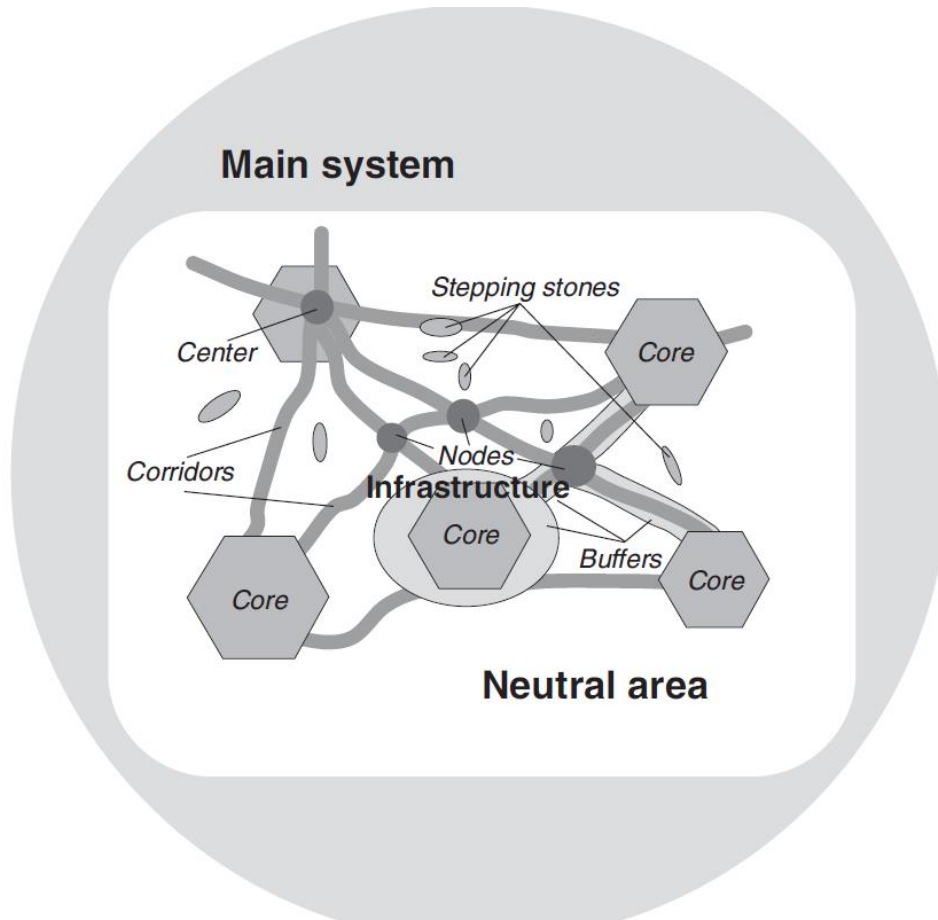
- **Integrated way** to manage our natural capital
- **Forward-thinking** solutions that enables us to tackle diverse and often compeating land managment issues in a spatially coherent manner
- **Applying nature-based solutions to improve GI**, for maintiaing healty ecosystem, reconnecting fragmented natural and semi-natural areas and restoring damaged habitats, so they can provide us with more and better goods and services
- In contrast to 'grey' infrasturucture, **GI is multifunctional**



Theoretical background of the GI concept: **Ecological networks**



Ecological networks



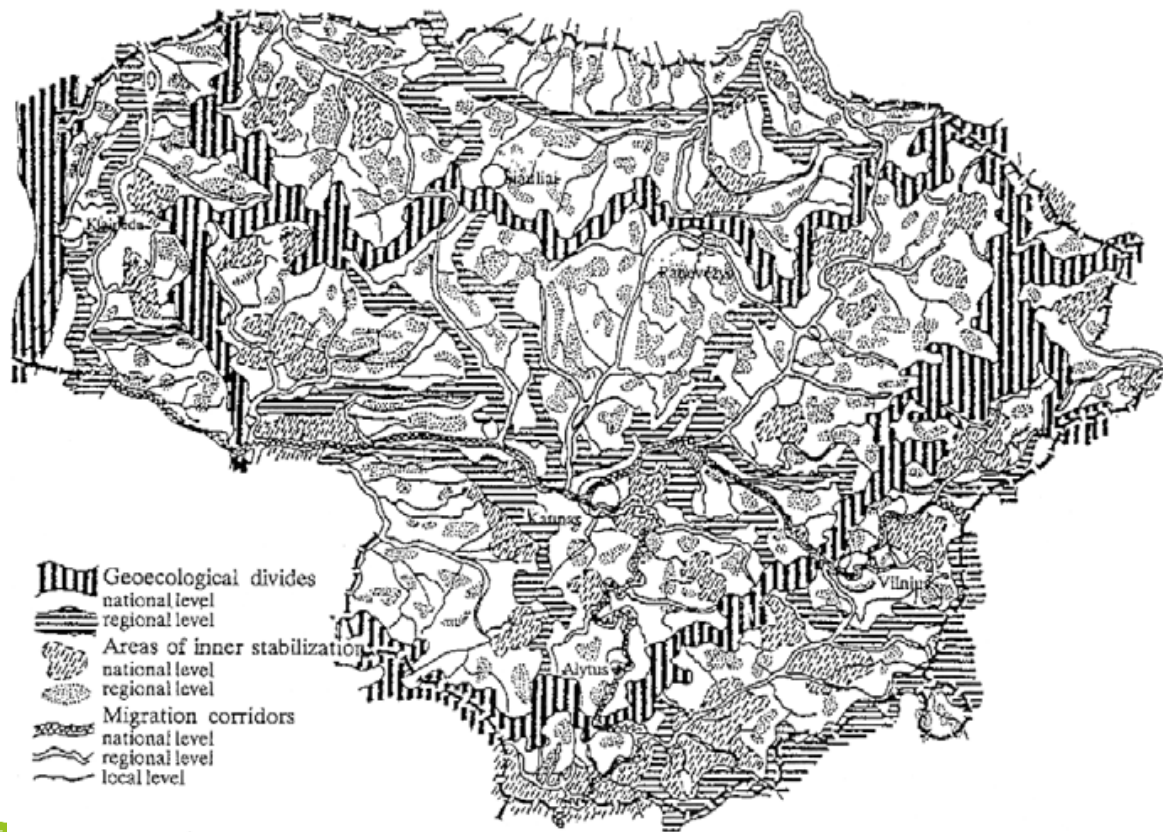
Structural elements of ecological networks

- **core areas** (i.e. central nodes in the network),
- **ecological corridors** (i.e. continuous connections between the nodes), stepping stones (i.e. non-continuous corridors),
- **buffer zones** (i.e. barriers between natural and anthropogenic areas), and
- **restoration areas** (i.e. anthropogenic areas that are being managed to make them more natural)

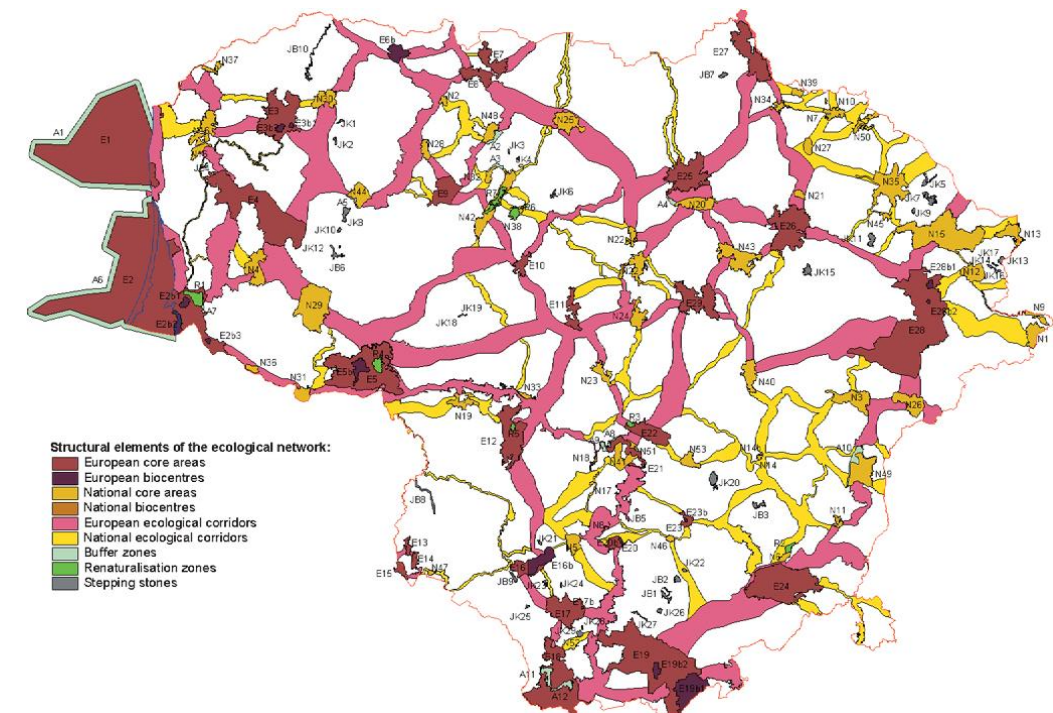


Ecological networks: Lithuania

Lithuanian Nature Frame (*Kavaliauskas, 1995*)



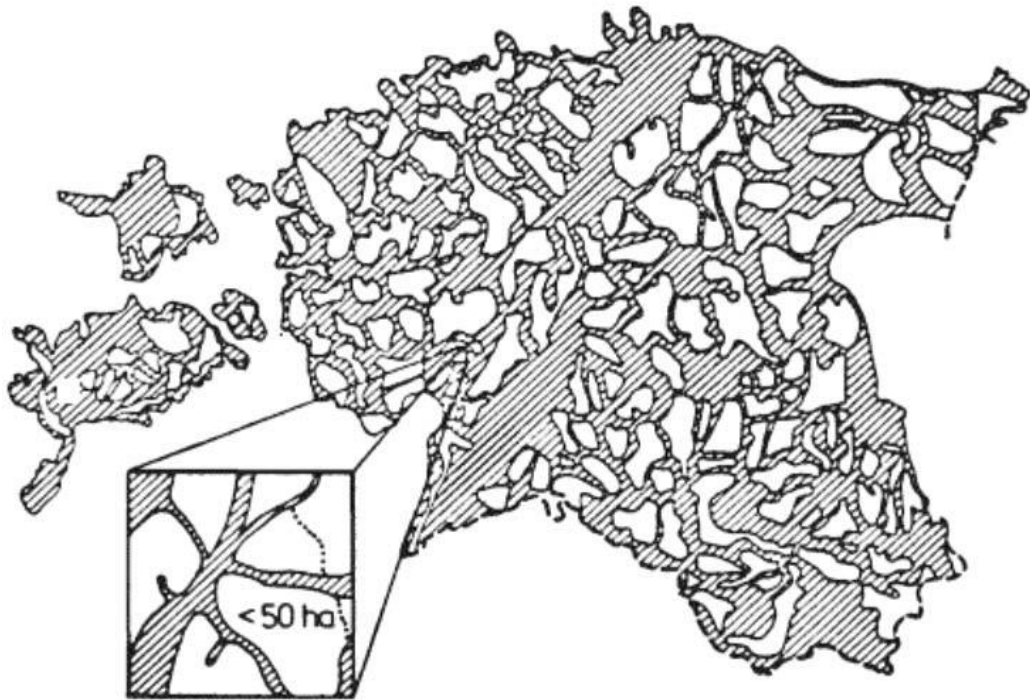
Lithuanian ECONET as part of the Pan-European Ecological network (PEEN).



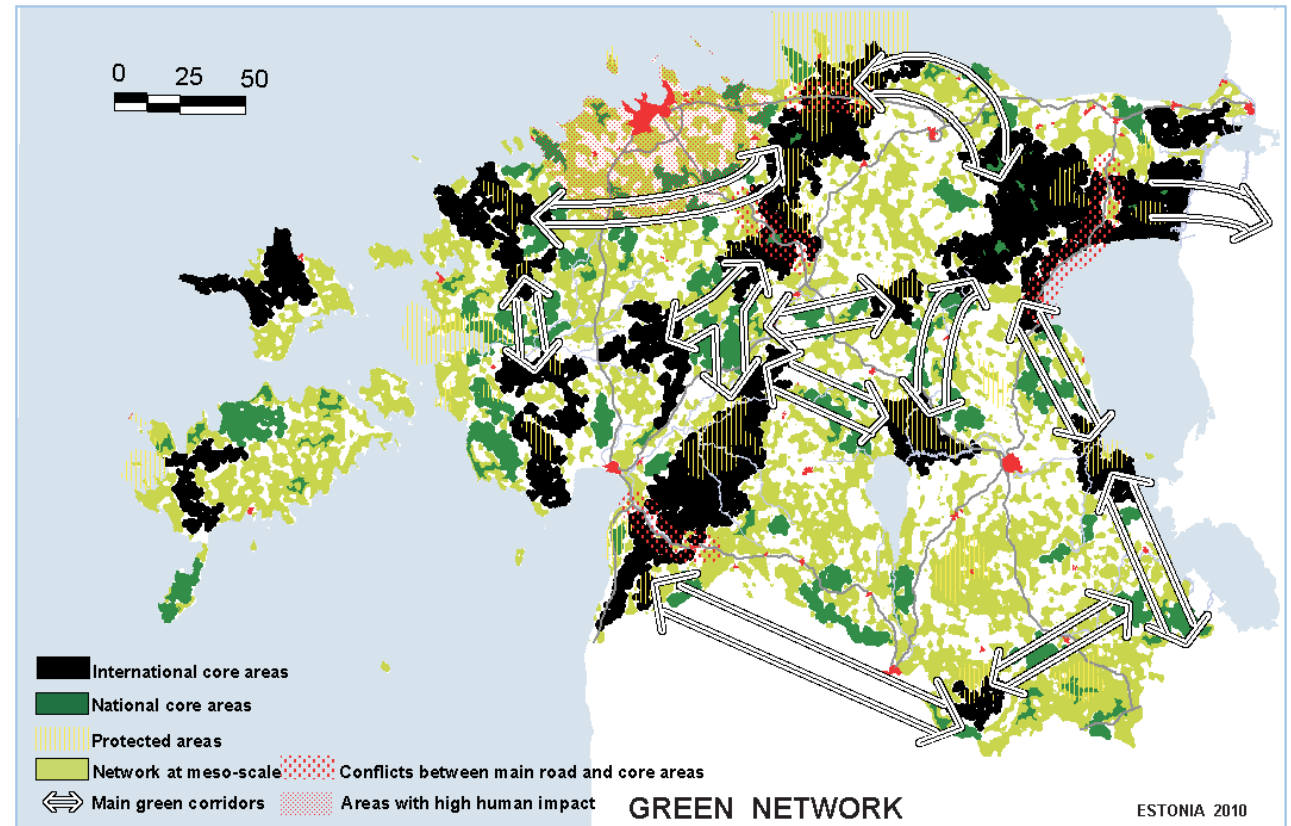
Source: Kavaliauskas, P., 1995. The nature frame: Lithuanian experience.
 Landschap 12 (3), 17–26.

Ecological networks: Estonia

Estonian network of ecologically compensating areas (*Jagomägi, 1983*)

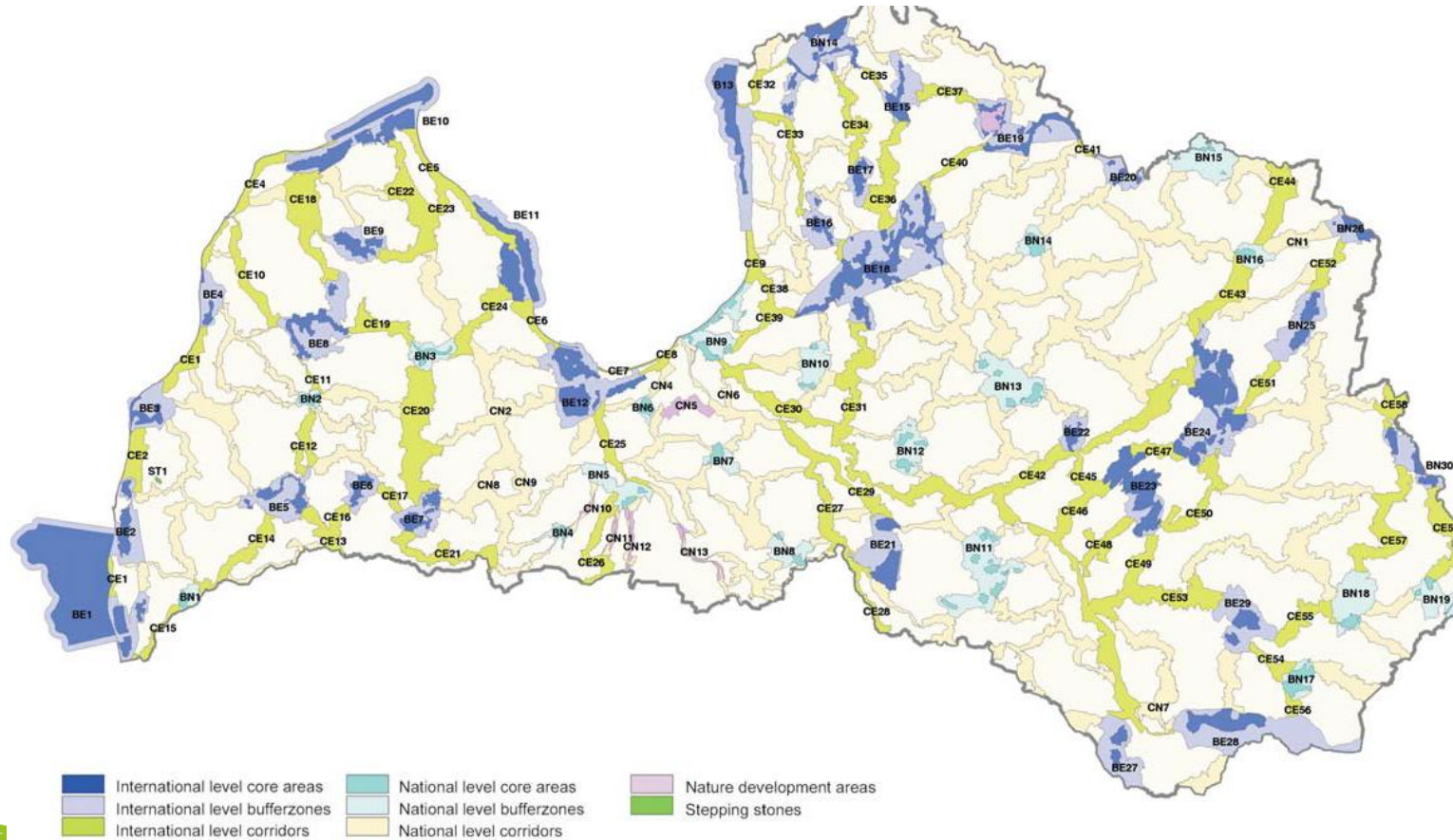


Green network, Estonia – Vision 2010



Ecological networks: Latvia

Latvian ECONET as part of the Pan-European Ecological network (*PEEN*)



Source:

The new aspect brought up in the GI concept: **Ecosystem Services**



Ecosystem Services - all the benefits people derive from nature

Provisioning services

Products directly used by people

Food:

- Crops, wild plants, tea, honey etc.
- Reared and wild animals and their outputs

Materials:

- Timber, hay, fibbers, herbs for medicine etc.
- Genetic material

Energy:

- Biomass for energy

Regulating services

Related to the way ecosystems regulate environmental media or processes

Mediation of waste

- Filtration, accumulation

Mediation of flows

- Erosion control and water flow maintenance

Maintenance of nature processes

- Lifecycle and habitat maintenance;
- Water conditions, soil formation, climate control etc.

Cultural services

Related to the cultural or spiritual needs of people

Physical and intellectual interactions

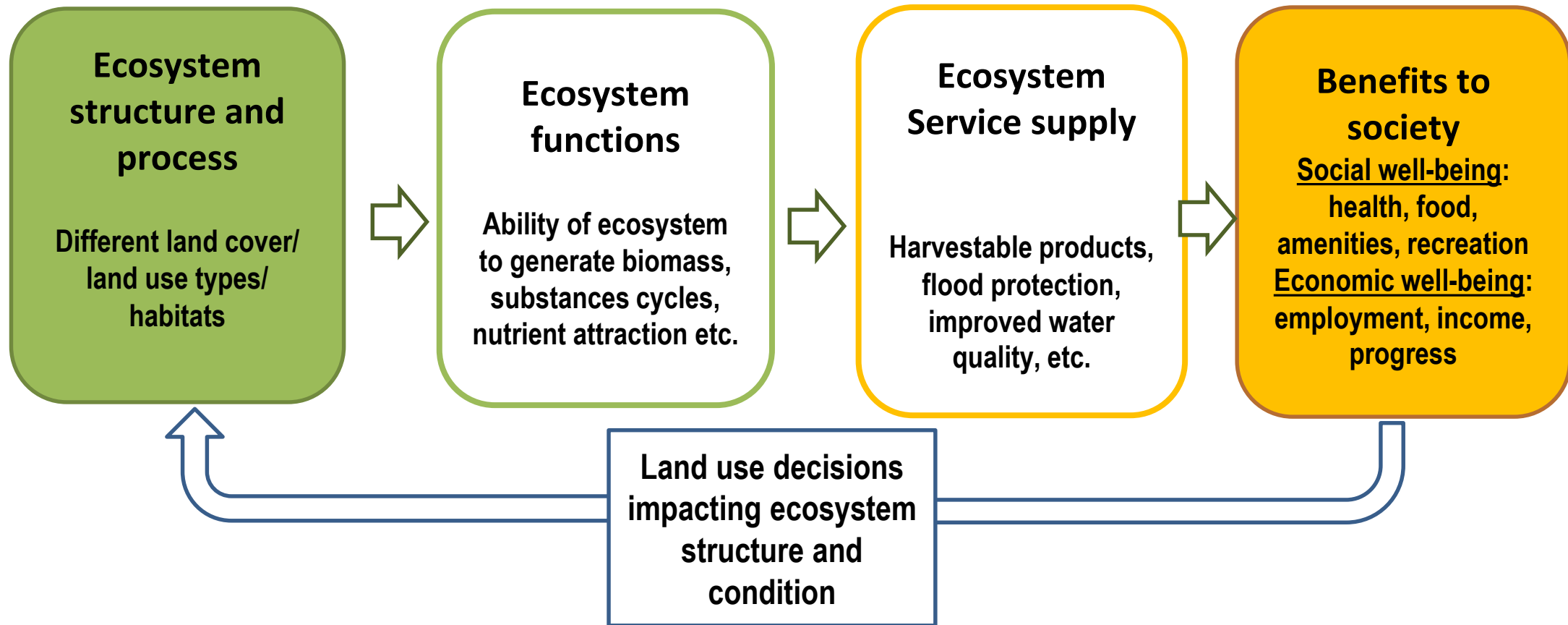
- Recreation
- Educational and scientific value
- Aesthetic, cultural heritage value

Spiritual, symbolic interactions

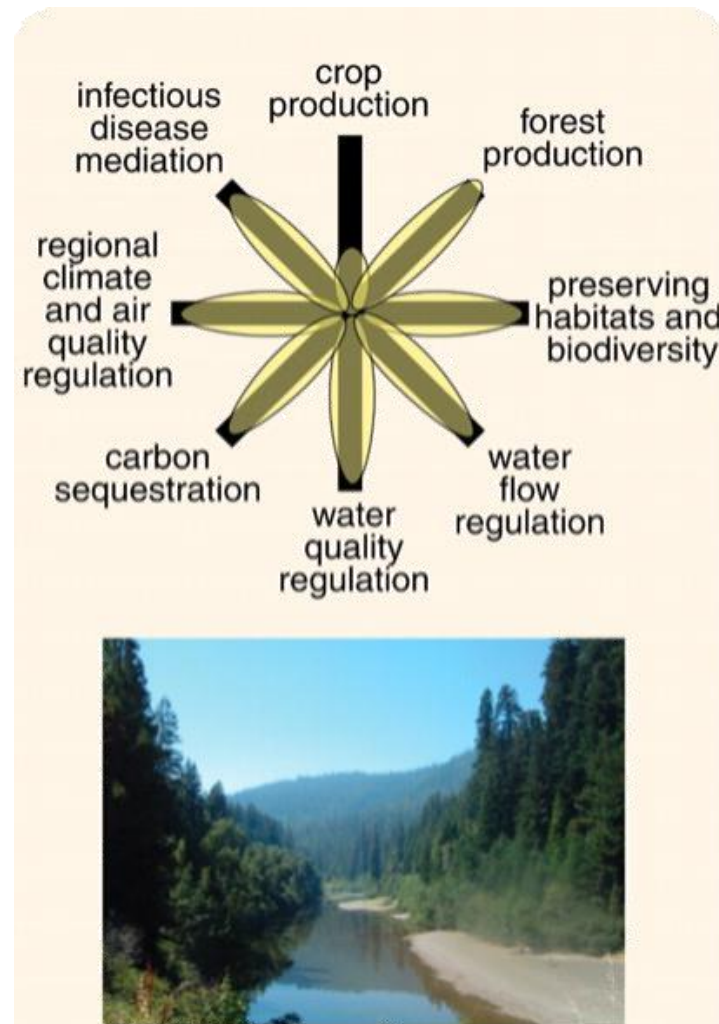
- Symbols and traditions
- Existence and bequest value



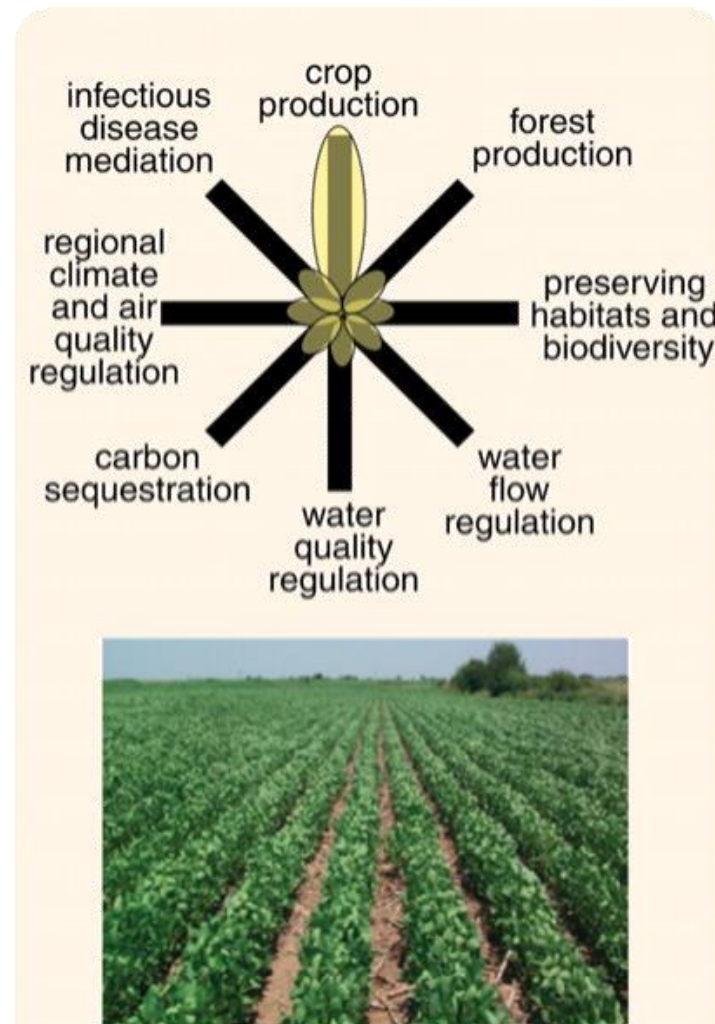
ES concept describing the mutual connection between ecosystem and well-being of society



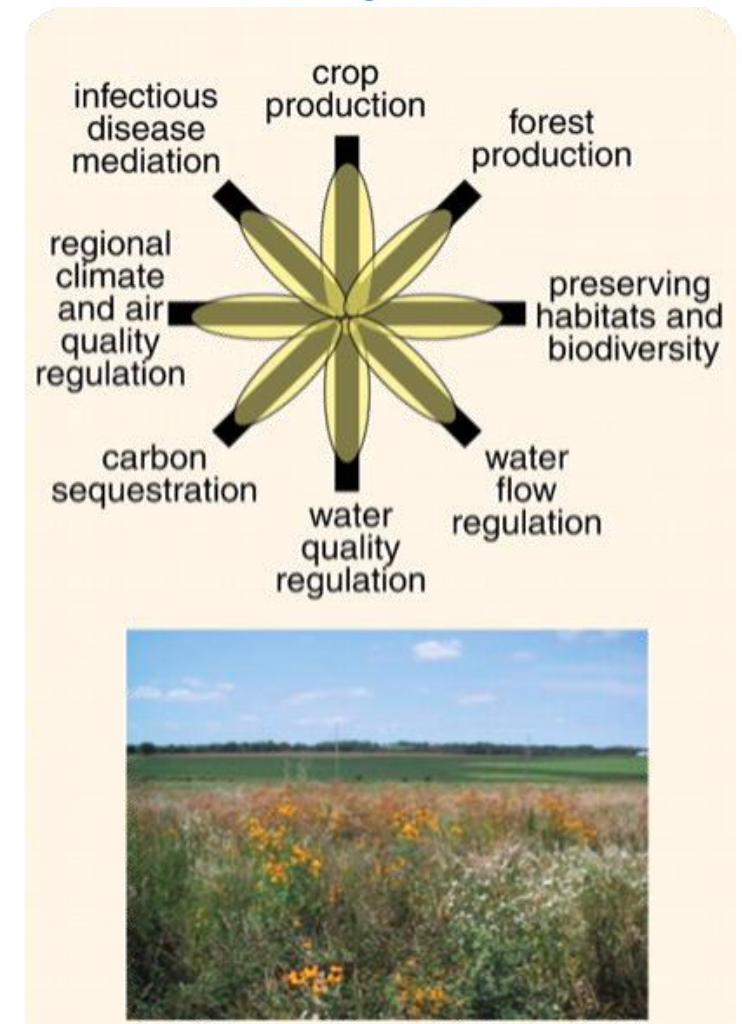
Impact of management practice on ES supply: trade-off analysis



Unmanaged nature



Intensively managed cropland



Sustainable managed croplands

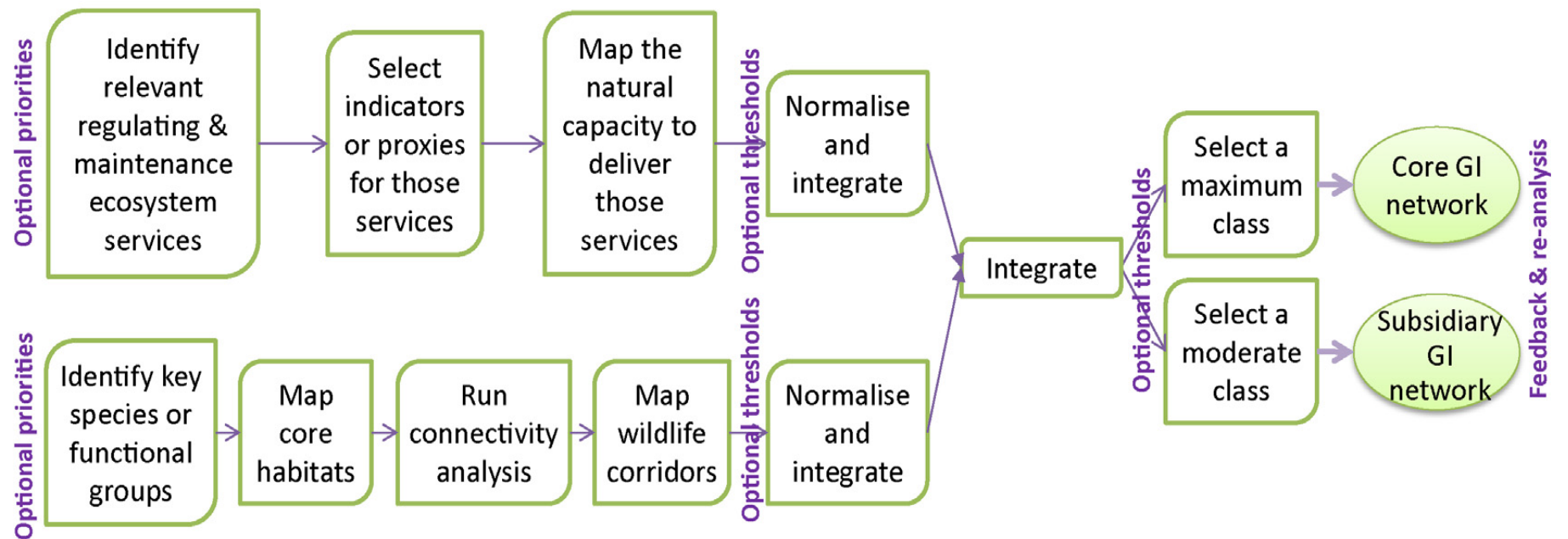


Examples of recent attempts to map GI



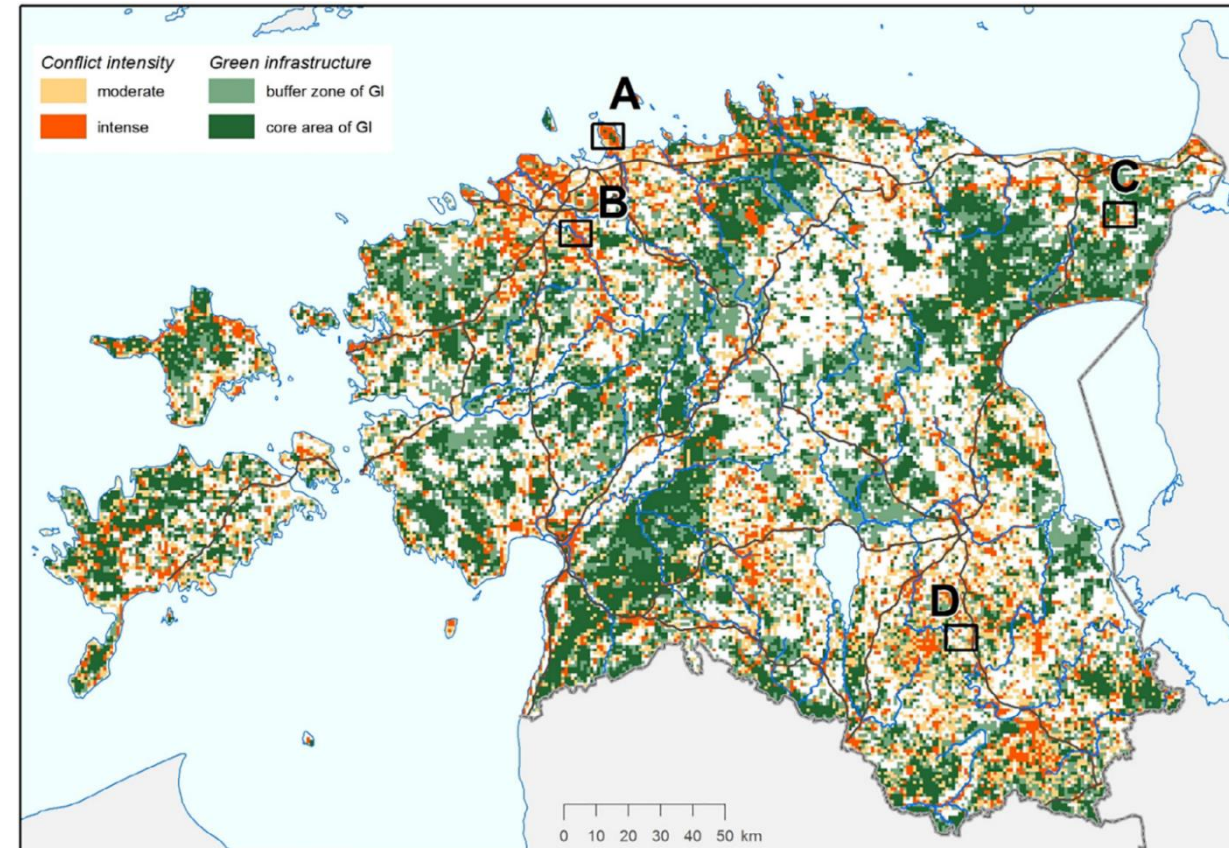
Example of mapping of GI at Pan-European scale, 2015

- Quantification of the natural capacity to deliver ecosystem services;
- Identification of essential core habitats and their connectivity analysis;
- Normalization of original values of ecosystem service and core habitat & corridor assessment;
- Integration of obtained results into a meaningful network of GI.



Example of mapping of GI at national scale: Estonia, 2018

- Compilation spatially explicit datasets (e.g. landcover, nature conservation data, soils, topography, water courses as well as roads and other brown infrastructure elements);
- Expert scoring of ecological value of each land use type;
- Normalization of variables and weighting, based on expert rating of their relative importance;
- calculation of greenness and brownness indices and conflict hotspots



Source: Mander et al., 2018. Green and brown infrastructures support a landscape-level implementation of ecological engineering. *Ecological Engineering* 120: 23–35.

Green infrastructure includes:

- **Natural ecosystems/green network** providing various ecosystem services
- **Nature-based solutions**, which imitate or utilize ecosystem services:
 - *eco-ducts, fish ladders*
 - *rain water management techniques,*
 - *river protection belts etc.*

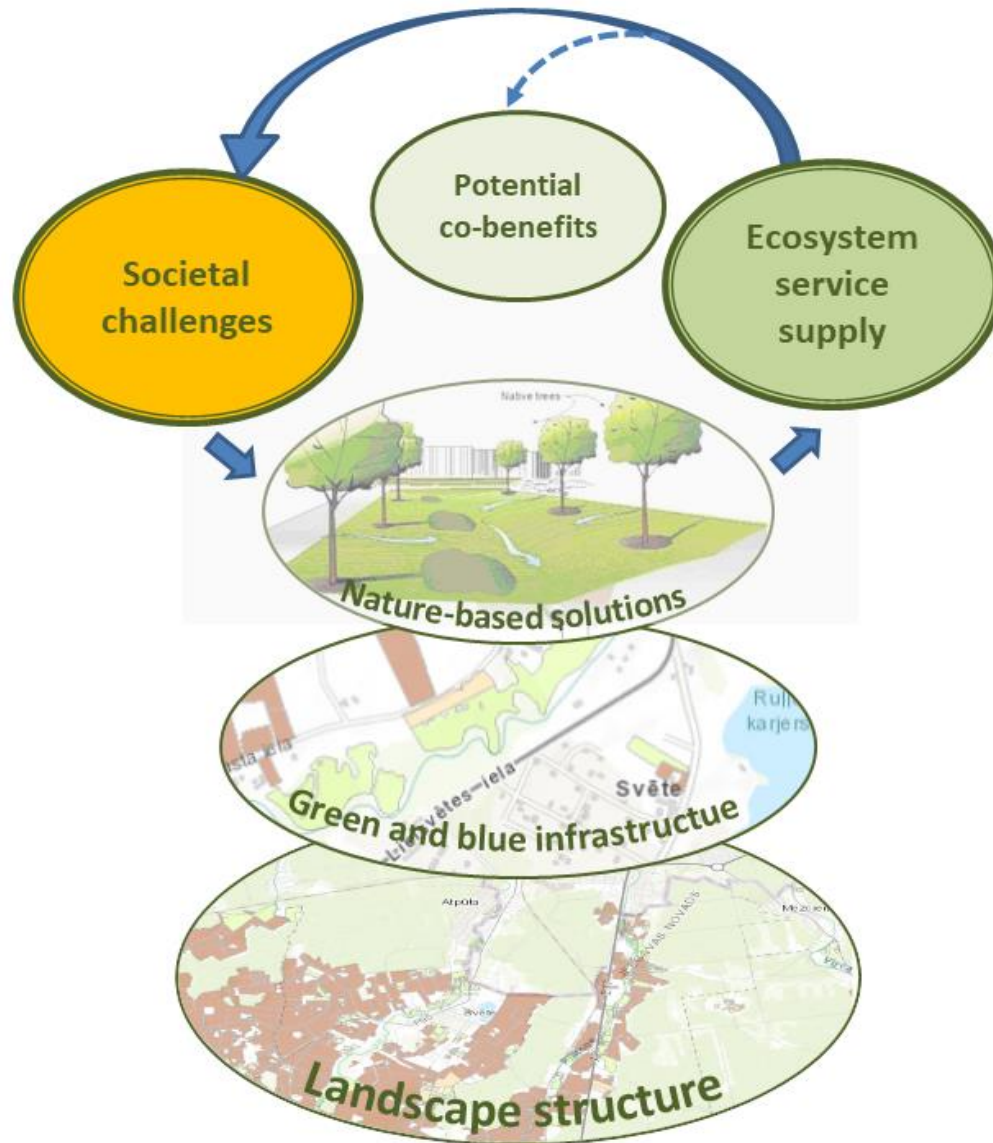


Examples of NBS in river landscapes

Nature-based solution	Revitalisation of floodplains	Protection/establishment of wetlands	Site-specific land-use adaptation
Addressed challenge	Reduction of flood risks	Mitigation of climate change	Soil erosion
Examples of co-benefits	Biodiversity protection Recreation Drinking water provision	Biodiversity protection Flood regulation Water quality protection	Biodiversity protection Recreation Water retention
Utilised ecosystem process	Natural water retention capacity	Carbon sequestration in soil and vegetation	Natural soil cover providing soil fixation
Examples of NBS actions	Reconnection rivers and floodplains Allowing of meandering	Enhance water retainment Initiate typical plant communities	Extensify of agricultural land use Transform fields into grasslands



Source: Albert C., et al.2019. Addressing societal challenges through nature-based solutions: How can landscape planning and governance research contribute? Landscape and Urban Planning 182: 12–21.



Role of landscape planning in design of GI & NBS

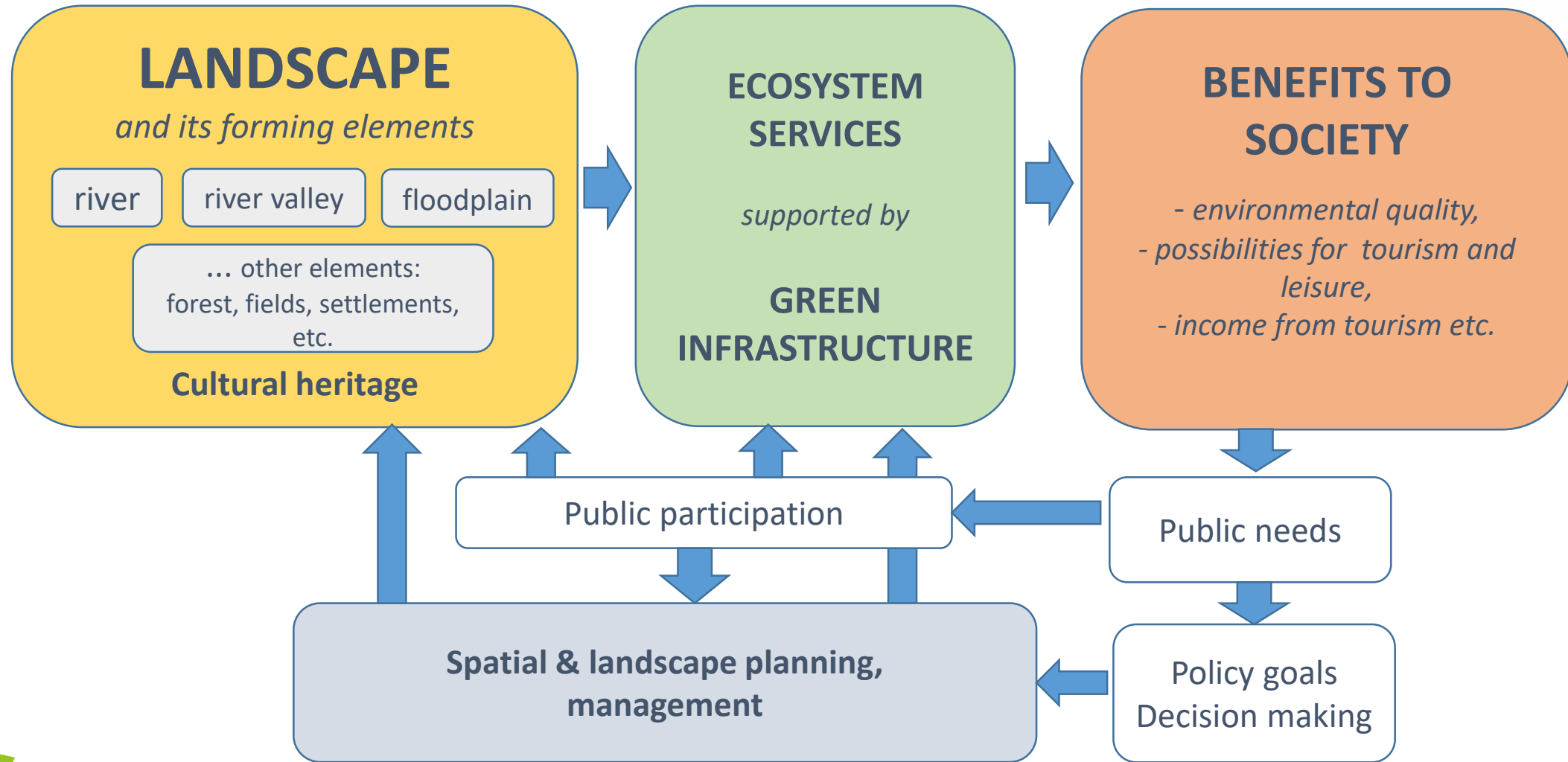
Landscape planning provides great opportunities for:

- improving of the GI
- selection of the most suitable sites for particular NBS

Source: Albert C., et al. 2019. Addressing societal challenges through nature-based solutions: How can landscape planning and governance research contribute? *Landscape and Urban Planning* 182: 12–21.



ENGRAVE Conceptual framework



ENGRAVE methodology for integrated landscape & GI planning

Main steps	Methods
1. Identification of GI forming features relevant for the particular planning scale	<ul style="list-style-type: none"> Assessment of ecological value and ecosystem service supply. Selection of criteria/indicators for assessment of areas forming GI Prioritisation of areas forming GI (e.g. based on multi-criteria analysis)
2. Assessment of threats/identification of problem areas	<ul style="list-style-type: none"> cold-spot/hot-spot analysis identification of problem areas/risk assessment
3. Development of scenarios for GI improvement	<ul style="list-style-type: none"> defining of measures /nature-based solutions suitable for the particular problem areas selection of areas where particular solutions would be the most effective;
4. Assessment of the proposed scenarios	<ul style="list-style-type: none"> Landscape-ecology analysis of the proposed scenarios Trade-off analysis Stakeholder involvement
5. Designing & implementation of the appropriate measures/ NBS	

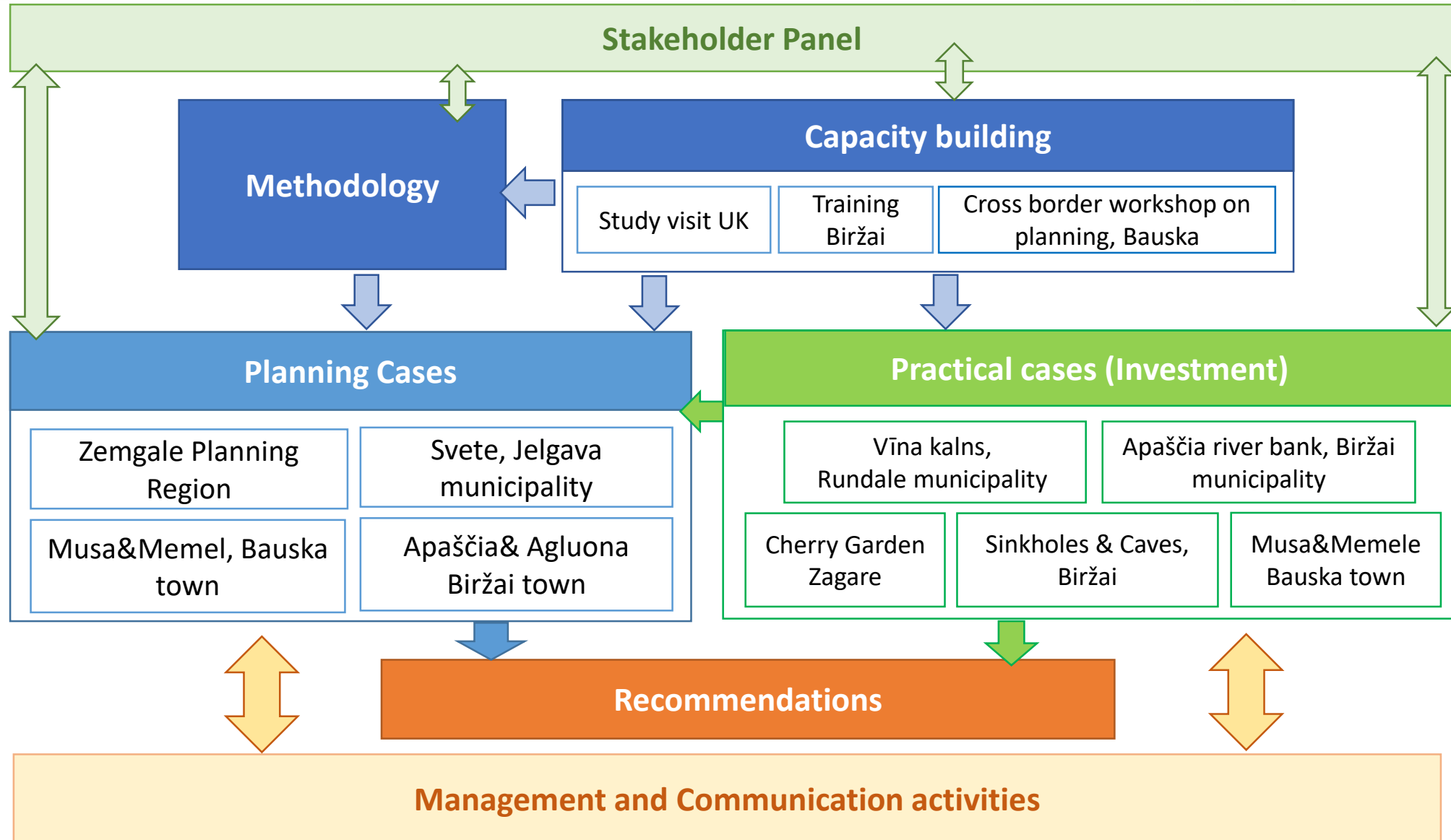


Green infrastructure forming features (key components)

GI forming components	Pan-European scale	National scale	Regional scale	Municipality scale	River valley scale	Local scale
Ecosystem service supply potential	X	X	X	X	X	X
Network of core habitats for species	X	X	X			
Connecting habitats	X	X	X	X		
Areas of high ecological value	X	X	X	X		
Valuable landscape elements			X	X	X	X
Natural features with specific ecological function (wetlands, rapids etc.)				X	X	X
Other (artificial) elements providing nature based solutions				?	X	X



ENGRAVE Project approach scheme





Thank you for the attention!

