EU LIFE Programme integrated project

“Implementation of River Basin Management Plans of Latvia towards good surface water status”

LIFE18 IPE/LV/000014 - LIFE GOODWATER IP

DEVELOPING METHODOLOGY FOR ASSESSING THE IMPACT OF THE NATURE-BASED SOLUTION ON THE AQUATIC ECOSYSTEM

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THE PROJECT | LIFE GOODWATER IP

Project implementation time: **01.01.2020.-01.12.2027**
Total budget: **14,568,050.00**
Coordinating Beneficiary: **Latvian Environment, Geology and Meteorology Centre (LEGMC)**

Partnership |19 partners | Public administration institutions | Scientific research institutions | Local and regional authorities | Companies managing the State property | Non-governmental organzations

The objective | to improve the status of water bodies at risk in Latvia by means of the full implementation of the focus laid down in 4 river basin management plans | to achieve the EU environmental objectives of the Water Framework Directive (2000/60/EC)

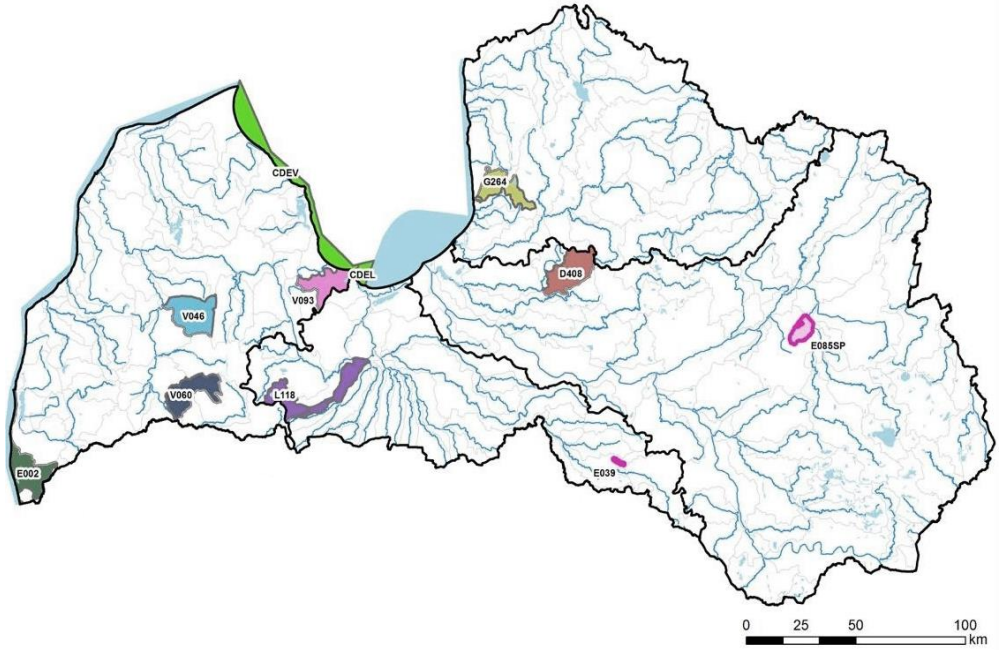
The specific objectives:



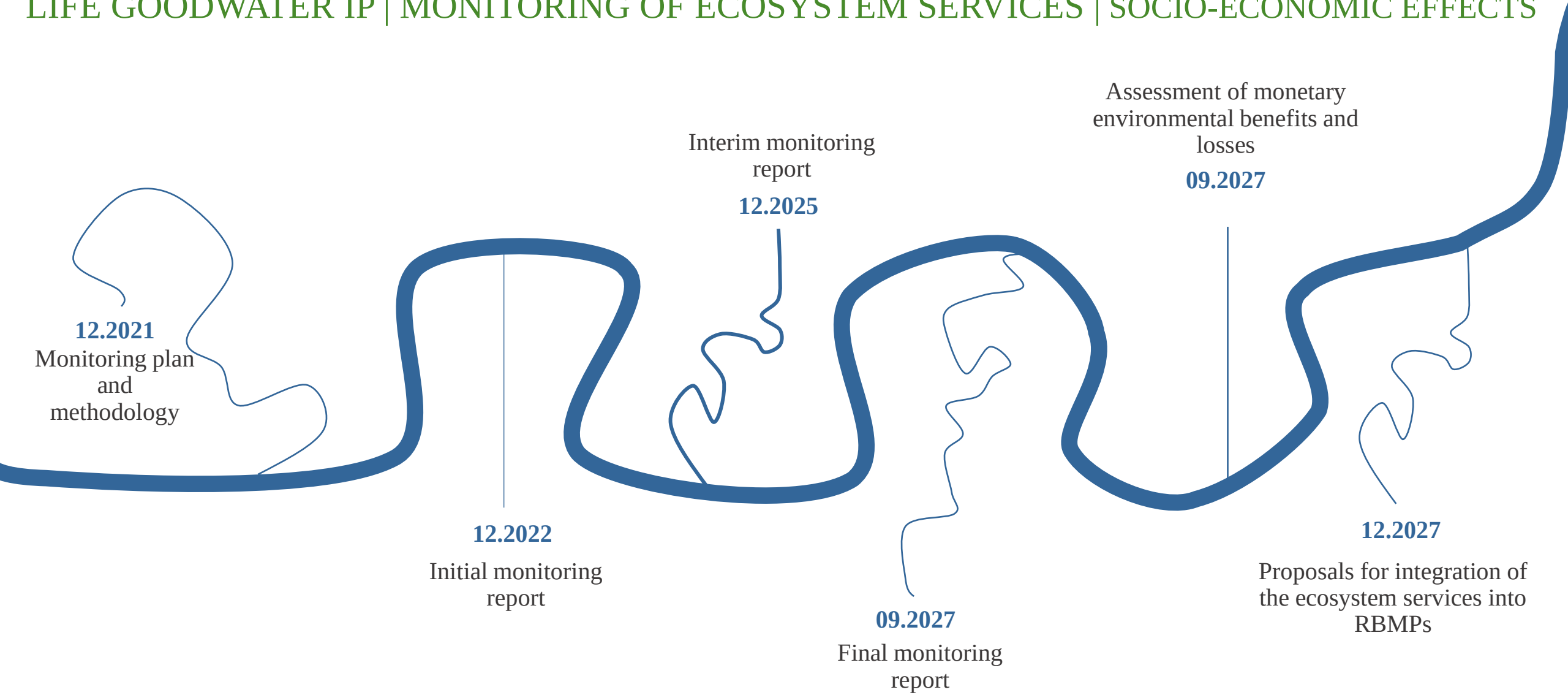



LIFE GOODWATER IP | ECOSYSTEM SERVICES ASSESSMENT

- 9 Demonstration sites
- Nature-based solutions (NBS):
  - Environmentally friendly drainage system elements - meandering, artificial rapids, two-stage ditches, bottom dams, sedimentation ponds
  - Green infrastructure elements in forest and agriculture lands - bufferstrips, constructed wetlands, overland flow areas
  - Solutions to reduce effects of hydrological and morphological modifications - fish passes, reconstruct culverts, improvement of riverbed
- Monitoring of ecosystem services (ES) restoration:
  - Development of methodology and indicators of ecosystem restoration in relation of concrete actions
  - Monitoring of ES before and after implementation of concrete actions:
    - the baseline monitoring
    - monitoring after implementation of the demonstration activities
- Integration on river basin management plans



LIFE GOODWATER IP | MONITORING OF ECOSYSTEM SERVICES | SOCIO-ECONOMIC EFFECTS



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LIFE GOODWATER IP | ECOSYSTEM SERVICES | STEPS OF METHODOLOGY DEVELOPMENT

1. Feasibility study: adoption/ transferability of similar methodology

2. Identified the services provided by aquatic ecosystems (CICES V5.1)

3. Framework of methodology: potentially identified ES, characteristic indicators and their units of measurement, created support material for experts

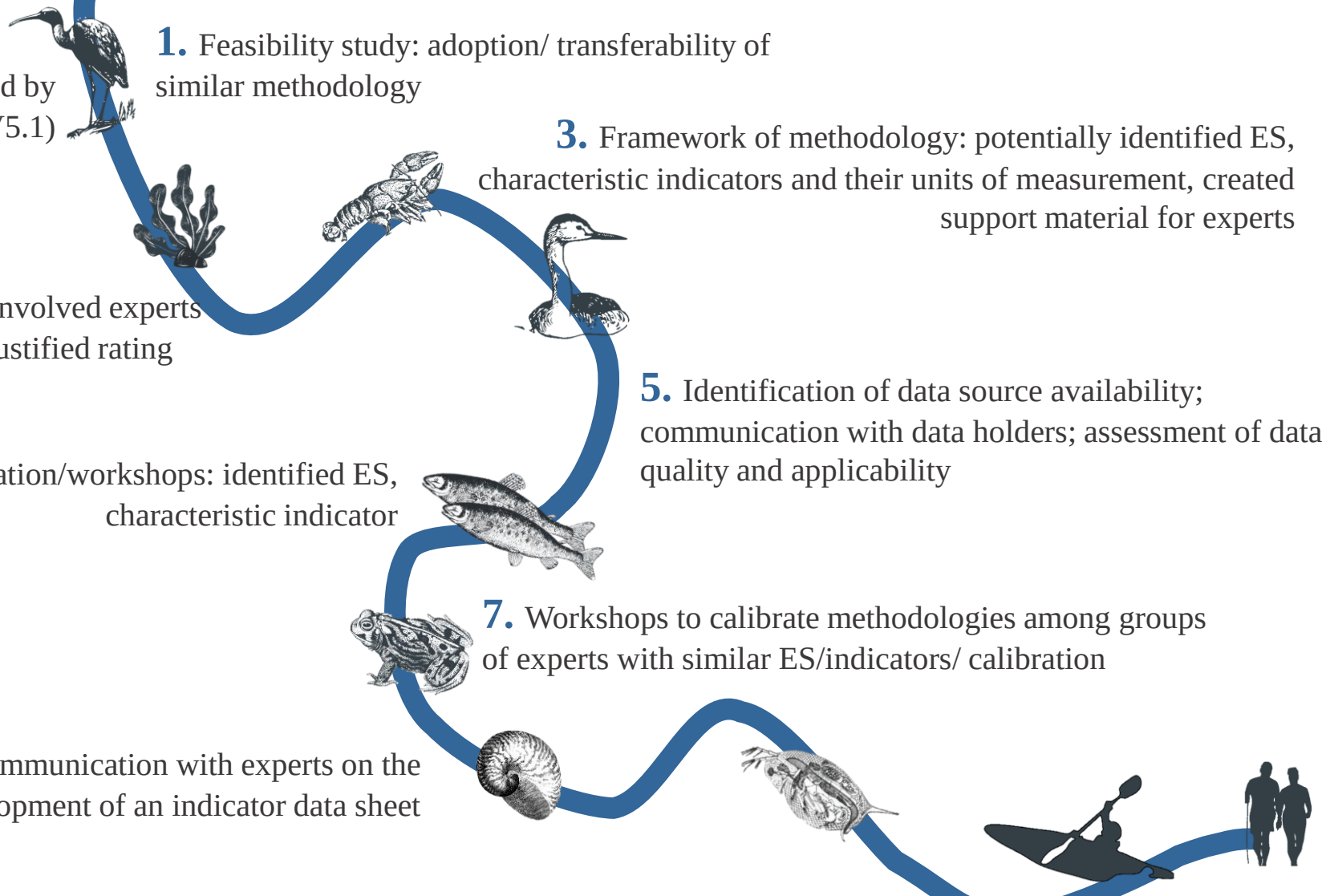
4. Identified group of potentially involved experts for indicator evaluation and scientifically justified rating

5. Identification of data source availability; communication with data holders; assessment of data quality and applicability

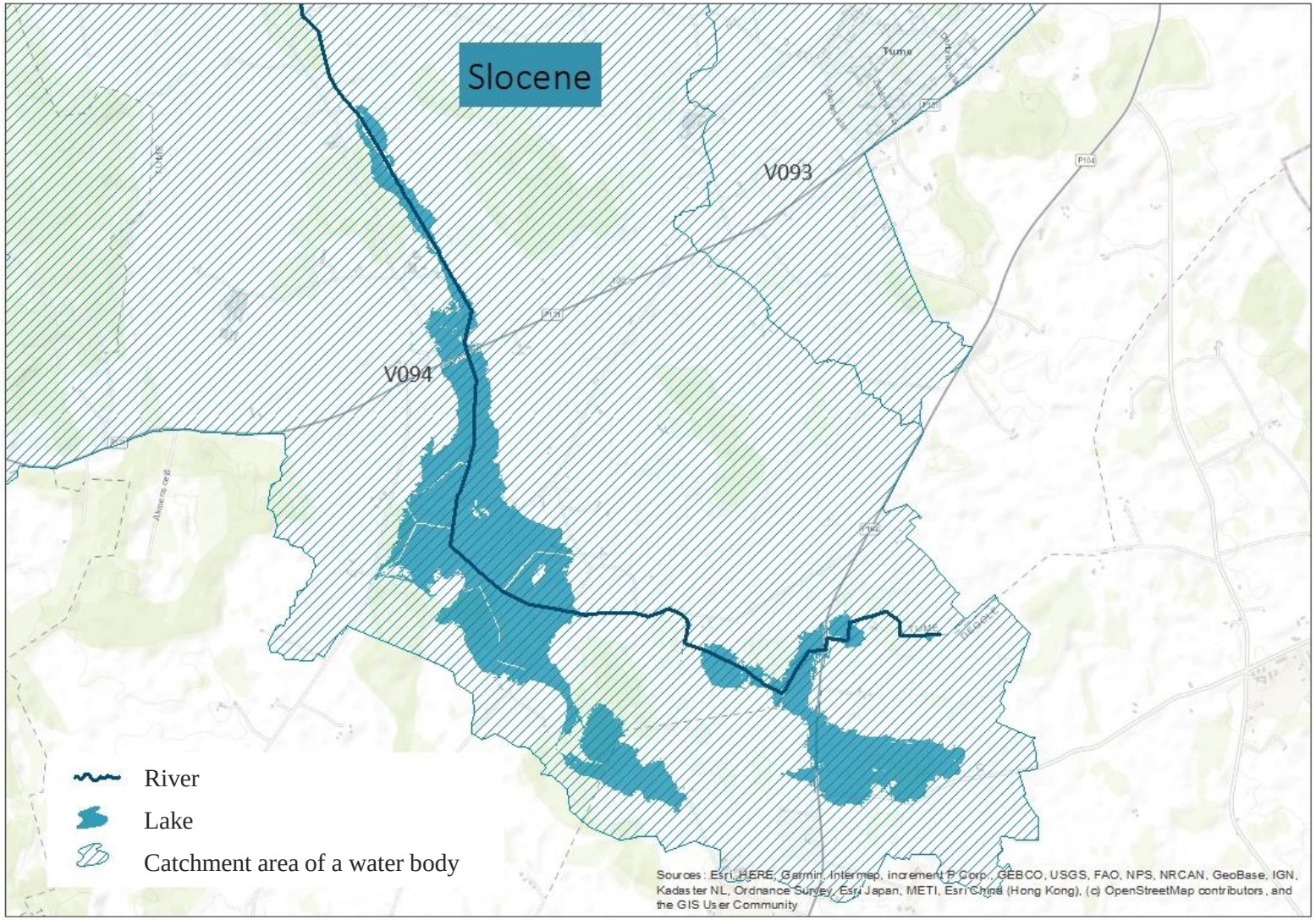
6. Communication/workshops: identified ES, characteristic indicator

7. Workshops to calibrate methodologies among groups of experts with similar ES/indicators/ calibration

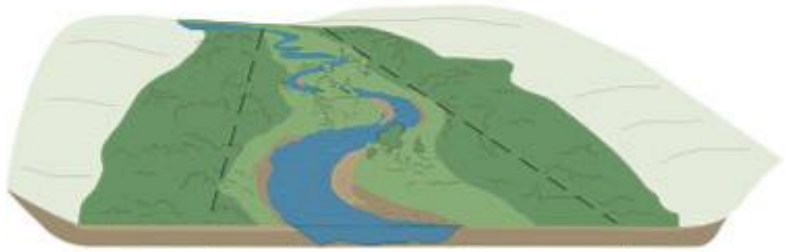
8. Individual communication with experts on the development of an indicator data sheet



LIFE GOODWATER IP | ECOSYSTEM SERVICES ASSESSMENT | SERVICE PROVIDING UNITS



RIVER **LAKE**

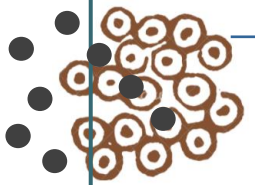


50% PROBABILITY OF FLOODING
(FLOODS WITH RECURRENCE EVERY 2 YEARS)

LIFE GOODWATER IP | ECOSYSTEM SERVICES | SCALE OF METHODOLOGY

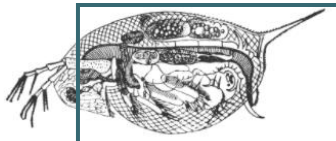
INDICATORS | An indicator is a quantitative measure which represents a complex system or phenomenon

ECOSYSTEM SERVICE



Bio-remediation

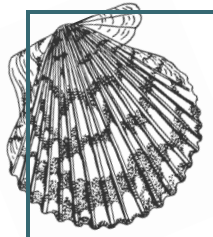
BIOPHYSICAL INDICATOR



Concentration of micro - organisms

Score 0-5 (indicator data sheet)

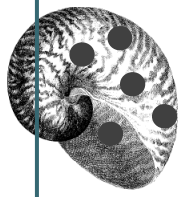
BIOPHYSICAL INDICATOR



Mollusc population

Score 0-5 (indicator data sheet)

BIOPHYSICAL INDICATOR



Concentrations of priority and harmful substances in biota

Score 0-5 (indicator data sheet)

LIFE GOODWATER IP | ECOSYSTEM SERVICES | INDICATORS

3 PROVISIONING SERVICES | 10 REGULATING SERVICES | 6 CULTURAL SERVICES (CONSOLIDATE)

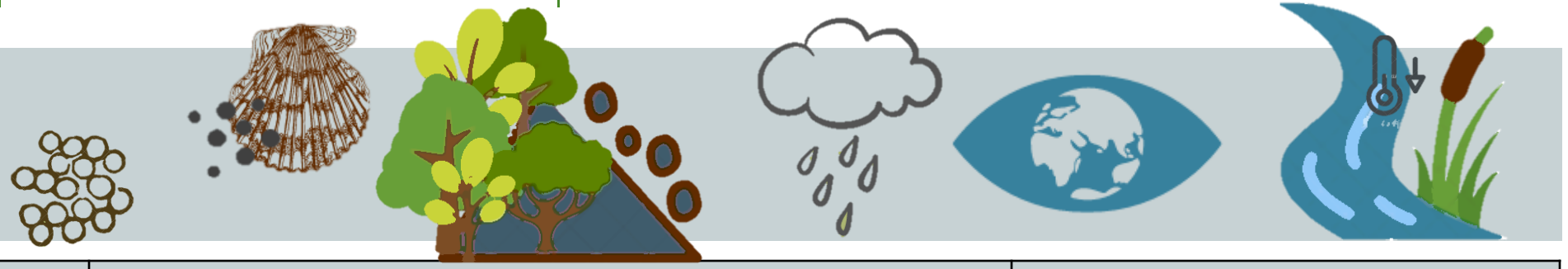
| ABOUT 46 INDICATORS | 22 EXPERTS | 18 SPATIAL UNITS

PROVISIONING ES

Class	CICES V5.0 (2018) Code	INDICATOR	Measurements
Fibres and other materials from wild plants for direct use or processing (excluding genetic materials)	1.1.5.2	Volume of reeds (*Phragmites australis*) harvested in lakes **(lake) (Flow)**	t/ha -1 (dry matter)
Wild animals (terrestrial and aquatic) used for nutritional purposes	1.1.6.1	Diversity of fish species of interest to fisherman **(lake/river) (Potential)**	Sum of points
		Industrial (fishing) productivity, fishing productivity, fishery productivity **(lake) (Flow)**	Kg/ha
Freshwater surface water used as an energy source	4.2.1.3	Amount of energy produced **(river) (Flow, Potential)**	kWh/ha per year

LIFE GOODWATER IP | ECOSYSTEM SERVICES | INDICATORS

REGULATION



Class	CICES	INDICATOR	Measurements
Bio-remediation by micro-organisms, algae, plants, and animals	2.1.1.1	Ecological quality of the water body, by macrozoobenthos **(lake/river) (Potential)**	LMI index (for rivers) and LLMMI index (for lakes) on a scale from 0-1
		Composition, occurrence and biomass of the phytoplankton **(lake) (Potential)**	Biomass mg / l, species diversity (number of taxa), chlorophyll a concentration µg / l
		Composition, occurrence, biomass of the zooplankton **(lake) (Potential)**	Biomass mg / l, species diversity (number of taxa)
		Composition, occurrence, biomass and structure of the macrophyte **(lake/river) (Potential)**	Shannon diversity index
Filtration/sequestration/storage/accumulation/regulation by micro-organisms, algae, plants, and animals	2.1.1.2/ 2.2.5.1	Proportion of "filters" of the macrozoobenthos ecological group **(lake/river) (Potential)**	%
		Composition, occurrence and biomass of the phytoplankton **(lake) (Potential)**	Biomass mg / l, species diversity (number of taxa), chlorophyll a concentration µg / l
		Composition, occurrence, biomass of the zooplankton **(lake) (Potential)**	Biomass mg / l, species diversity (number of taxa)
		Composition, occurrence, biomass and structure of the **macrophyte (lake/river) (Potential)**	%
Control of erosion rates	2.2.1.1	The structure and slope of the bank **(river) (Potential)**	Degrees of slope
Hydrological cycle and water flow regulation (Including flood control, and coastal protection)	2.2.1.3	Floodplain flooding possibility **(lake/river) (Potential)**	Index
		Flow rate and dynamics, river continuity **(river) (Flow)**	Index, points
		Water exchange rate **(lake/river) (Flow)**	Year

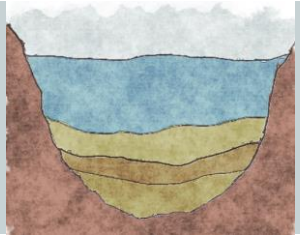
LIFE GOODWATER IP | ECOSYSTEM SERVICES | INDICATORS

REGULATION ES

Class	CICES	INDICATOR	Measurements
Seed dispersal	2.2.2.2	River continuity (longitudinal, lateral) **(river) (Potential)**	Sum of points
Maintaining nursery populations and habitats (Including gene pool protection)	2.2.2.3	Abundance of mphibian species **(lake) (Potential / Flow)**	Specimens / km
		Summarized occurrence of protected water bird species and umbrella species **(lake/river) (Potential / Flow)**	Bird species according to nesting reliability characteristics
		Abundance and diversity rate of the macrozoobenthos **(lake/river) (Potential / Flow)**	H 'value of the Shannon-Wiener diversity index
		Abundance and diversity rate of the phytoplankton **(lake) (Potential / Flow)**	Species diversity expressed as phytoplankton community characteristics (PCD)
		Abundance and diversity rate of the macrophyte **(lake/river) (Potential / Flow)**	Shannon diversity index
		Transfer of unsaturated fatty acids to fish from phytoplankton (zooplankto) **(lake) (Potential)**	Sum of points
		Number of juvenile salmonids (salmon, sea trout/trout) **(river) (Flow)**	Density of specimens (units/100 m2)
		Latvian fish index **(river) (Flow)**	Limit value – from 0 to>=0.88
		Specially protected fish species **(river, lake) (Potential)**	Sum of points
		Shading areas proportions **(river) (Potential)**	%

LIFE GOODWATER IP | ECOSYSTEM SERVICES | INDICATORS

REGULATION ES



Class	CICES	INDICATOR	Measurements
Dilution by freshwater and marine ecosystems	5.1.1.1	Flow rate and dynamics, river continuity **(river) (Potenial)**	Index, points
		Water exchange rate **(lake/river) (Potential)**	Year
Mediation by other chemical or physical means (e.g. via Filtration, sequestration, storage or accumulation)	5.1.1.3	Differences in the concentration of priority substances and/or hazardous substances in the sediments of a water body **(lake/river) (Flow)**	Index
		Soil potential **(lake/river) (Potential)**	Index
Decomposition and fixing processes and their effect on soil quality	2.2.4.2	Soil fertility **(Fooldplain) (Potential)**	Index
Regulation of temperature and humidity, including ventilation and transpiration	2.2.6.2	Surface albedo of land cover type **(lake/river) (Flow)**	%

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LIFE GOODWATER IP | ECOSYSTEM SERVICES | INDICATORS

Cultural ES

Class	CICES V5.0 (2018) Code	INDICATOR	Measurements
Characteristics of living systems that that enable activities promoting health, recuperation or enjoyment through **active** or immersive interactions	3.1.1.1	Suitability for boating, swimming, fishing; boat bases and sites; swimming areas; pathways; boating and excursion routes; the value of building social relationships; memories, life-changing values	Data, expert assessment, survey
Characteristics of living systems that enable activities promoting health, recuperation or enjoyment through **passive** or observational interactions	3.1.1.2	suitability of boating (ecess); visual accessibility (from shores); boat bases and sites; swimming areas; pathways; camping and tent possibilities; picnic areas, watching towers for landscapes and birds; therapeutic value; the value of building social relationships; memories, life-changing values	Data, expert assessment, survey
Characteristics of living systems that enable **scientific/education** investigation or the creation of traditional ecological knowledge	3.1.2.1/3.1.2.2	Specially protected nature territories (proportion); informative nature trails and sights; scientific projects; scientific publications; popular scientific publications; involvement and interaction with nature; knowledge of local ecologies; memories, life-changing values	Data, expert assessment, survey
Characteristics of living systems that are resonant in terms of **culture or heritage**	3.1.2.3	historical population area and road network; transformation degree; archeological, architectural and industrial monuments; cultural heritage infrastructure, local guides; water-related cultural heritage objects; cultural and artistic objects; knowledge of locals about historical events, practices, environmental changes; identification regarding the history and culture of the place; memories, life-changing values	Data, expert assessment, survey
Characteristics of living systems that enable **aesthetic experiences**	3.1.2.4	Aesthetic quality of the landscape based on structural diversity, naturalness, uniqueness and views (which includes accessibility)	Number/area of landscape elements with expressed value Data and survey
Elements of living systems that have **symbolic/sacred** meaning	3.2.1.1/3.2.1.2	narrative, symbolic, sacred places; natural monuments of symbolic or sacred meaning; nature tourism objects with a symbolic or sacred meaning; knowledge of places, natural elements with symbolic and / or sacred meanings; spiritual values; place identity (and uniqueness); memories, life-changing values	Data, expert assessment, survey

ECOSYSTEM SERVICES ESSESSMENT | CONSTRUCTED WETLANDS

Co-benefits of Regulation Ecosystem Services:

Latvia, Jelgava (Foto: Maija Fonteina Kazeka)

- Filtration/sequestration/storage/accumulation/regulation by microorganisms, algae, plants, and animals
- Hydrological cycle and water flow regulation (Including flood control, and coastal protection)
- Bioremediation by microorganisms, algae, plants, and animals
- Dilution by freshwater and marine ecosystems
- Mediation by other chemical or physical means (e.g. via Filtration, sequestration, storage or accumulation)
- Decomposition and fixing processes and their effect on soil quality
- Regulation of temperature and humidity, including ventilation and transpiration
- Maintaining nursery populations and habitats (Including gene pool protection)
- Control of erosion rates

INDICATOR	Measurements
Proportion of "filters" of the macrozoobenthos ecological group **(lake/river) (Potential)**	%
Composition, occurrence and biomass of the phytoplankton **(lake) (Potential)**	Biomass mg / l, species diversity (number of taxa), chlorophyll a concentration mg / l
Composition, occurrence and biomass of the macrophyte **(lake/river) (Potential)**	Biomass mg / l, species diversity (number of taxa), chlorophyll a concentration mg / l
Flow rate and dynamics **(river) (Potential)**	Index, points
Water exchange rate **(lake/river) (Potential)**	%
Differences in the concentration of priority substances and/or hazardous substances in the biomass and structure of the macrophyte **(lake/river) (Potential)**	Year
Composition, occurrence, biomass and structure of the phytoplankton **(lake) (Potential)**	Index
Summarized occurrence of substances and/or hazardous substances in the soil fertility **(floodplain) (Potential)**	Shannon diversity index
Surface albedo of land cover type **(lake/river) (Flow)**	Bird species according to nesting reliability characteristics
Abundance and diversity rate of the macrozoobenthos **(lake/river) (Potential / Flow)**	%
Abundance and diversity rate of the macrophyte **(lake/river) (Potential / Flow)**	H 'value of the Shannon-Wiener diversity index
	Shannon diversity index

INDICATOR	Measurements
The structure and slope of the bank **(river) (Potential)**	Degrees of slope

LIFE GOODWATER IP | MESSAGE TO HOME

- Is the assessment of ES capacity/potential more certain than the assessment of EP flow to measure the impact and of efficiency of NBS to promote water quality?
  - Ecological responses to restoration or new methods of recurring management are generally slow and difficult to predict, therefore might be challenging to interpret the results
  - Changes within the ecosystem, in the water body scale
  - Data quality of repeated measurements
- Could financial and social dimension support better understanding and application of NBS in water management?
  - Socio-economic assessment
  - Monetary values, Economic efficiency
  - Public, stakeholders opinion

PURE WATER IS THE WORLD'S FIRST AND FOREMOST MEDICINE

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