



PROGRESS
Interreg Europe



European Union
European Regional
Development Fund

Forest Ecosystem Services Mapping and Assessment Methodology

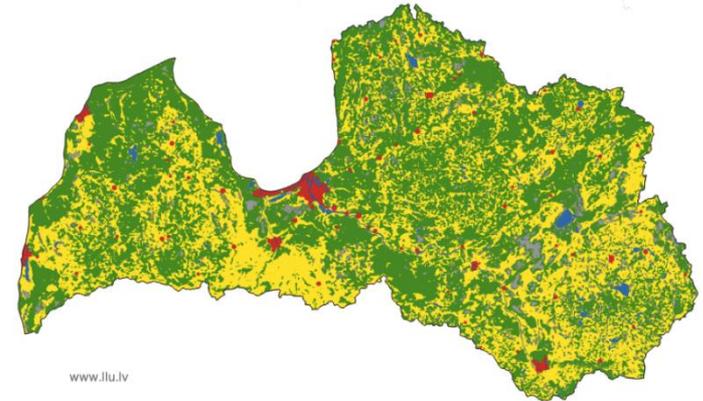
Zane Lībiete, Edgars Jūrmalis, Jānis Donis

Latvian State Forest Research Institute 'Silava'



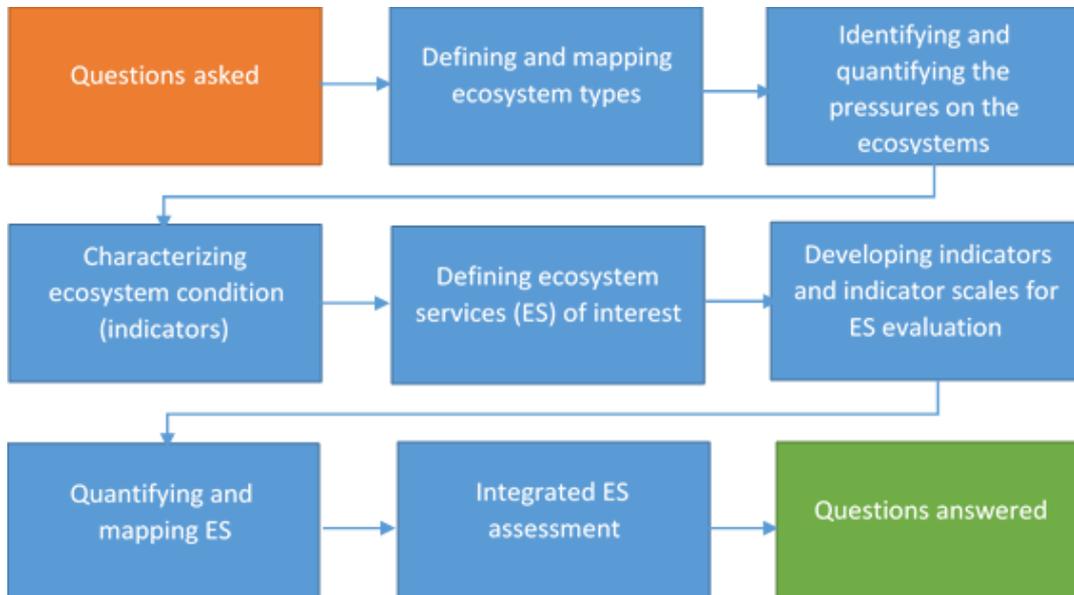
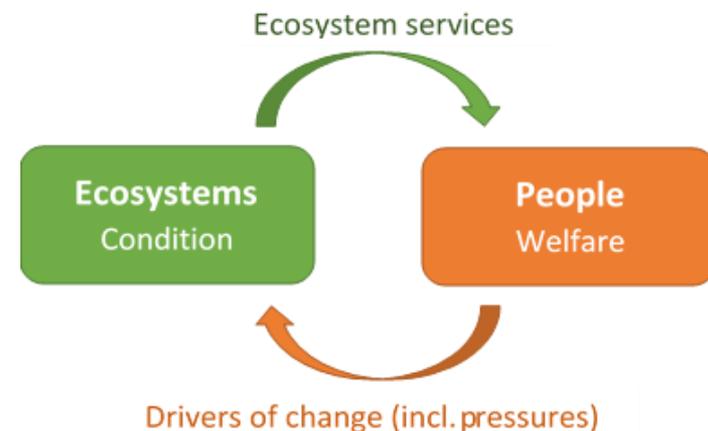
Background

- Forests in Latvia take up 53% of the land area, one half of the forests is public.
- According to the Law on Forests (2000), management and use of the forest must be **economically, ecologically, and socially sustainable**.
- Generally, forest is **freely accessible** to people (unless restricted by the private owner or located in a strict nature reserve) and is used for various purposes besides timber, including gathering of non-wood forest products, recreation etc.
- The demand for **multiple ecosystem services (ES)** is especially high with regard to public forests.



Framework

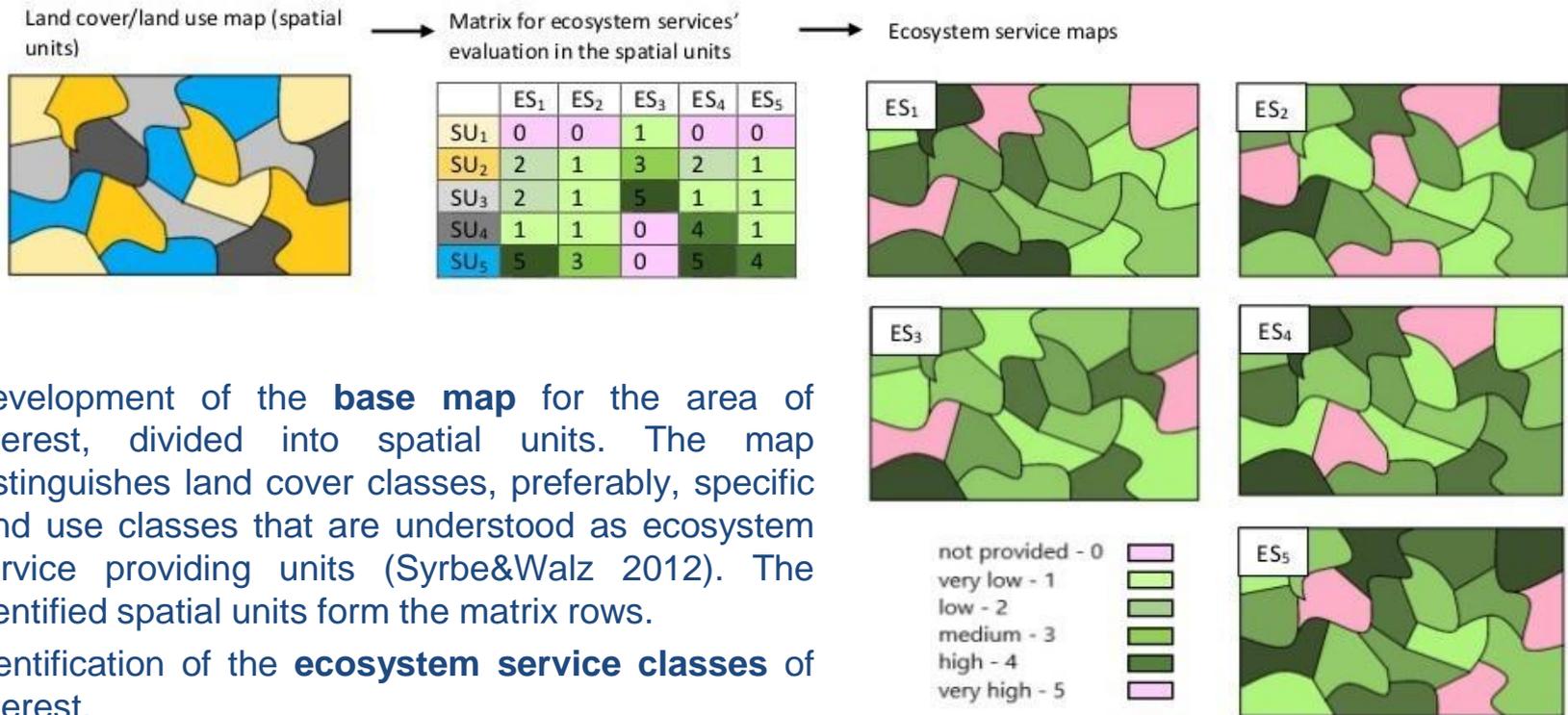
- Research programme ‘The impact of forest management on forest and related ecosystem services’, 2016-2020, funded by the manager of public forests – JSC «Latvia’s State Forests»
- The methodology is consistent with Mapping and Assessment of Ecosystem Services (MAES, 2020) framework and uses the Common International Classification of Ecosystem Services (CICES, v5.1)



- CICES, v5.1 - developed by the European Environment Agency (EEA). It supports their contribution to the revision of the System of Environmental-Economic Accounting (SEEA) which is currently being led by the United Nations Statistical Division (UNSD).
- Three sections of ES:
 - ✓ **Provisioning** (biotic and abiotic)
 - ✓ **Regulation and maintenance** (biotic and abiotic)
 - ✓ **Cultural** (biotic and abiotic).

Mapping method

- **Matrix model**, proposed by Burkhard et al. (2009, 2012, 2014), enables both expert involvement and use of models and measurement data.



- Development of the **base map** for the area of interest, divided into spatial units. The map distinguishes land cover classes, preferably, specific land use classes that are understood as ecosystem service providing units (Syrbe&Walz 2012). The identified spatial units form the matrix rows.
- Identification of the **ecosystem service classes** of interest.
- Development of the ES **evaluation indicators** for each ecosystem service class. The indicators form the matrix columns, i.e., they are assigned to each spatial unit.
- Development of **evaluation scales** for each indicator. The scale is following: 0 – ES not provided; 1 – ES value very low; 2 – ES value low; 3 – ES value moderate; 4 – ES value high; 5 – ES value very high.
- **Evaluation** of the ES in the spatial units.

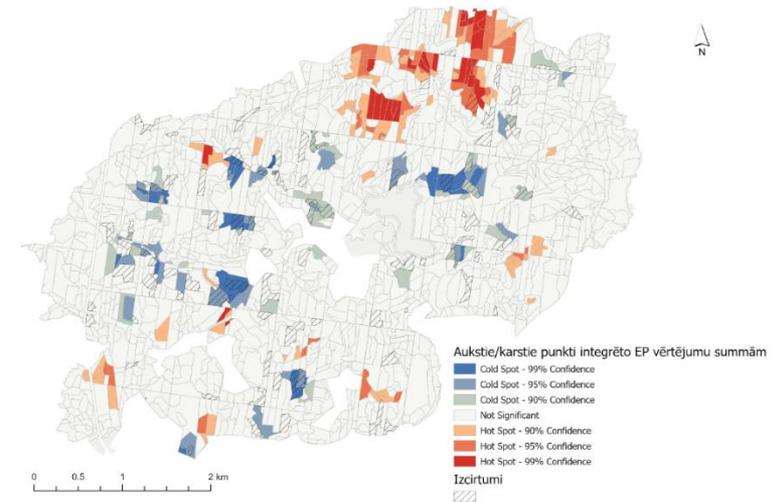
- Smallest spatial unit: **forest compartment**. The land use identification is based on forest land types (forest stand, clearing, wet areas etc.), further dividing the analyzed spatial units as parameters of each forest stand (forest type, age etc.).
- **ES classes** from CICES version 5.1 (EEA, 2020).
- Evaluation **indicators** generally based on the already existing recommendations, e.g., publications within the MAES framework (<https://biodiversity.europa.eu/maes>). Where data were available, we developed more detailed new indicators, based on literature sources and expert opinion.
- **Scales** developed according to information from previous and current research and published literature.
- **Detailed characterization** of forest ecosystems enables detailed assessment and use of biophysical indicators.

The developed indicators in all three ES sections

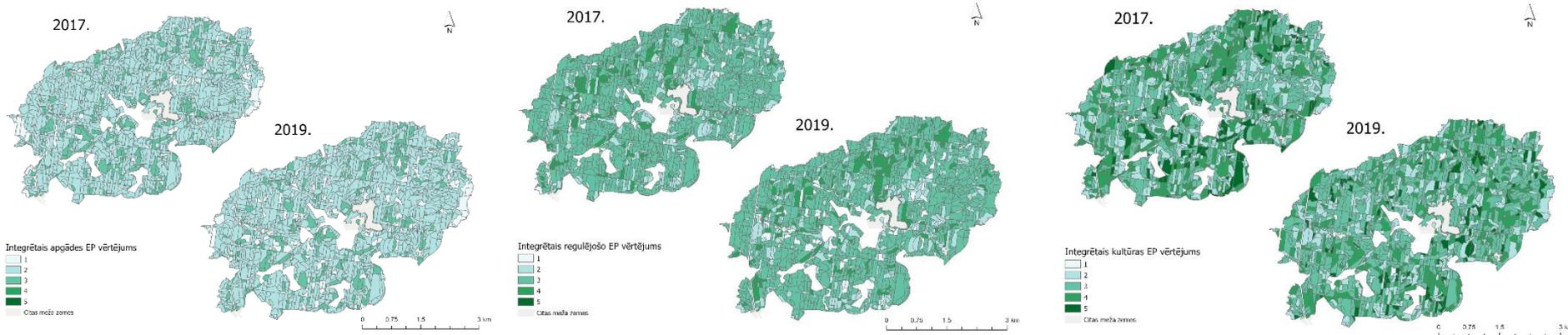
Provisioning	Regulation and maintenance	Cultural
<ul style="list-style-type: none"> • Timber volume and energy wood volume in final felling • Potential bilberry yield and potential lingonberry yield • Potential occurrence of nectar plants, edible plants, medicinal plants, decorative plants, cosmetic plants • Suitability of area for large game - moose, red deer, roe deer, wildboar • Amount of actually recorded game - moose, red deer, roe deer, wildboar • Amount of hunted game - moose, red deer, roe deer, wildboar 	<ul style="list-style-type: none"> • Carbon sequestration potential in living above-ground biomass • Amount of sequestered carbon in living biomass • Oxygen production by tree stand • Phytoremediation potential by trees and ground vegetation • Diversity of ecosystems • Length of undisturbed ecosystem development • Noise attenuation potential • Soil erosion reduction potential • Potential of stabilizing toxic heavy metals in the soil and in the litter layer 	<ul style="list-style-type: none"> • Suitability of forest for recreation • Suitability of forest for hunting • Visual attractiveness of the forest landscape

Testing the method

- Model area: forested catchment in public forests (forest cover >90%, >90% of forests managed by JSC «Latvia's State Forests»).
- 'Typical' forest for Latvian conditions, as refers to the dominant tree species, site type distribution etc.
- Diverse management activities implemented from 2015 to 2019 in the model area – ditch network maintenance, forest road construction, felling.
- Indicators calculated for the spatial units according to the algorithms and compartment attributes in the data base.



Hot/cold spots of the integrated ES assessment

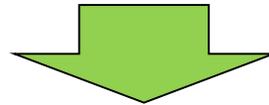


Integrated assessments of provisioning, regulating and cultural ES (left to right)

Application and next steps

Application:

- More **versatile** and **detailed** assessment of forest ecosystems – **integration** of assessment in the forest compartment attributes.
- **Planning** aid – identification of areas with highest/lowest ES provision, identification of trade-offs and synergies.



- **Multifunctional forest management.**



To-do-list for 2021:

- **Complementing** the framework with indicators describing additional **cultural** ecosystem services.
- **Upscaling** the existing indicators to the **whole country** (including all forests).
- Increasing the **visibility** of the method and results (currently enterprise-funded research; with no mandatory publicity events).
- Working on the **economic assessment** and **demand** side of the forest ecosystem services.



PROGRESS
Interreg Europe



European Union
European Regional
Development Fund

Thank you for attention!



Questions welcome



Project smedia