



Assessment of the potential for providing of Recreational Forest ecosystem service in NP Poloniny region

Ecosystem Services
in Transdisciplinary Approach

Eco
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Poznań 2025



Content

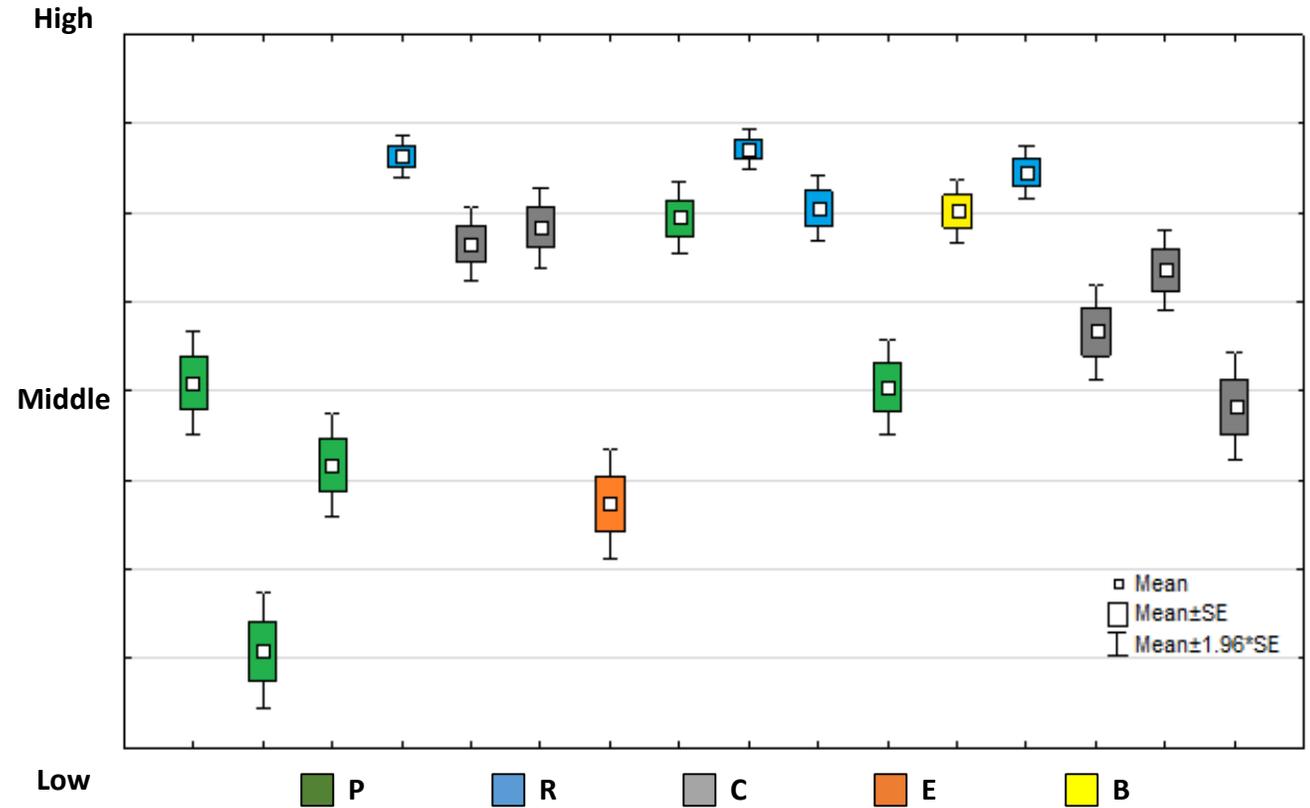
- FES – Forests provide a mix of Ecosystem Services
- Cultural FES and our expectations – what we anticipated before starting the study
- Evaluation methodology – how we measured and assessed cultural FES
- Results from Poloniny region – key findings from our research
- Discussion – interpretation of the results
- Conclusion – potential implications



Forests and ES

FES group	The importance of forests as a
P1	source of wood raw material and biomass
P2	source of game and hunting trophies
P3	source of firewood
R4	protection against natural disasters
C5	Space for recreation, sport, and health promotion
C6	protection against stress and diseases
E7	source of employment and income
P8	source of drinking water
R9	source of clean air (purification)
R10	protection against dust, imissions, noise
P11	source of forest fruits (mushrooms, berries, herbs)
B12	space for a diversity of flora and fauna
R13	protection against climatic extremes
C14	part of cultural heritage and history
C15	space for education and learning about nature
C16	source of aesthetic and spiritual experiences

Adapted from Millennium Ecosystem Assessment (2005) and Mederly et al. (2019)



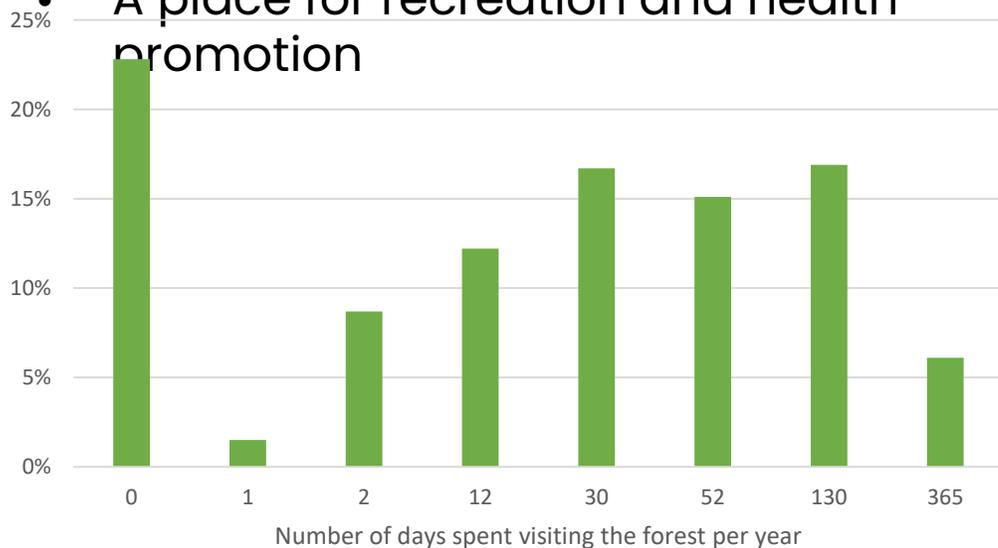
Group of FES	mean	homogeneity test		
Regulatory	2.892336	A		
Biodiversity	2.802920	A		
Cultural	2.613139			D
Provisioning	2.332847		C	
Economic benefits	2.145985		B	

Sarvašová Z., et al. (2025): J. For. Sci., 71: 195–204.

Forests and recreation ES

Forests are:

- A source of aesthetic and spiritual experiences
- Part of cultural heritage and history
- A place for education and learning
- A place for recreation and health promotion



Cultural ES

- Recreation and tourism – physical use of nature and landscape
- Landscape character and aesthetics – aesthetic values
- Natural and cultural heritage – intellectual and scientific values

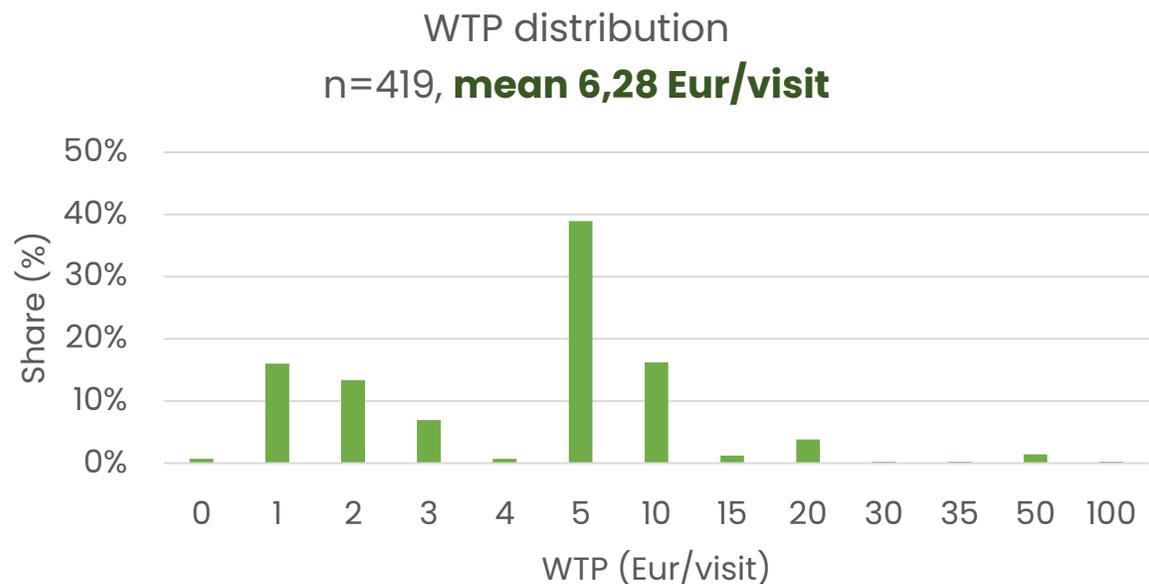
The results of representative survey SK 2024:
77 % respondents visit forests for recreation
53 % spent in forests more than 3 hours

Forests and recreation ES



For 66%, the main reason is rest.

Forests and recreation ES



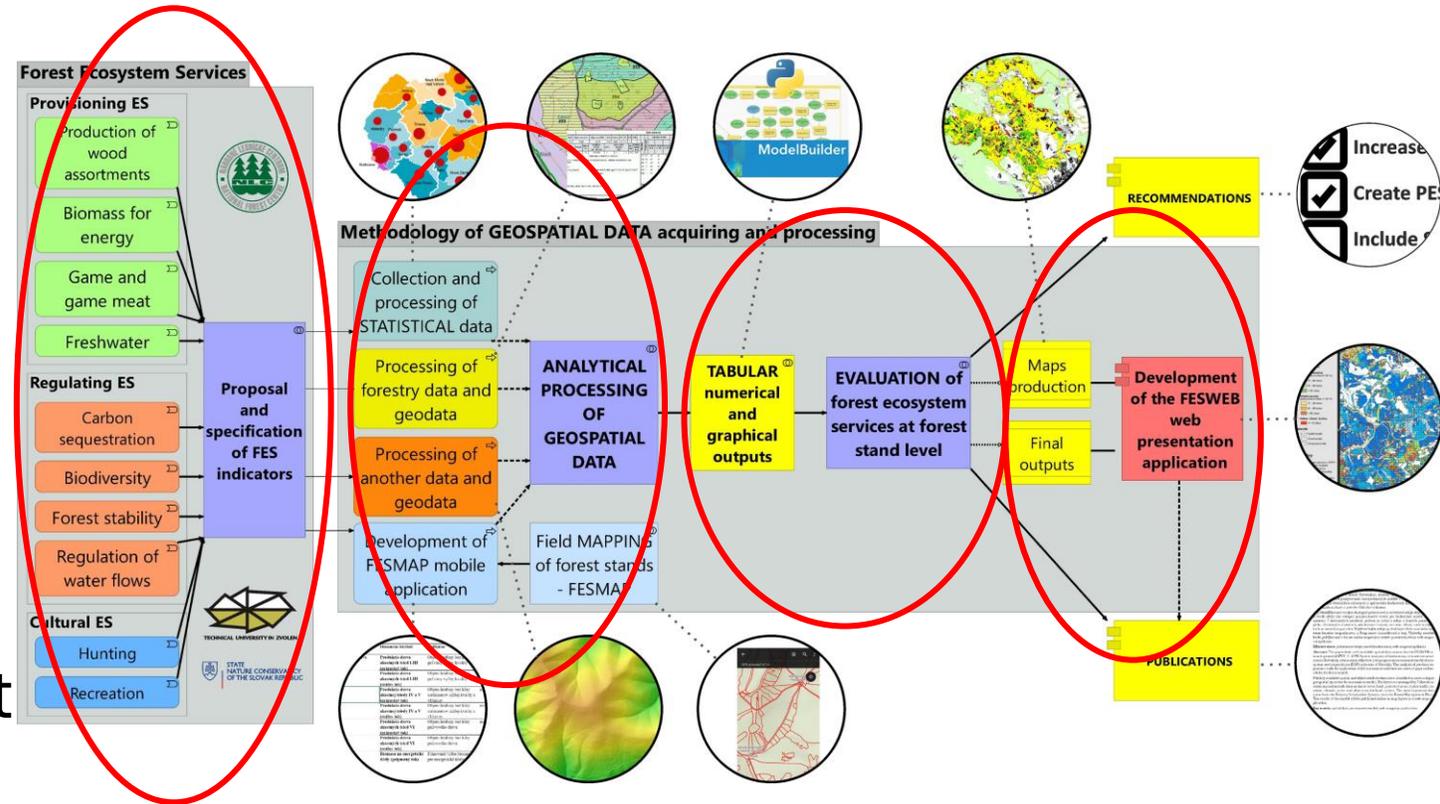
Average
830€/ha

value:

Indicator	Unit	CVM
Average visit	Number of days/year	59
Value of visiting the forest during the year	EUR/year/person	370
Population of Slovakia over 18 years of age (2024)	millions	4,56
Total value of recreational ESL forests in Slovakia	billion EUR	1,69

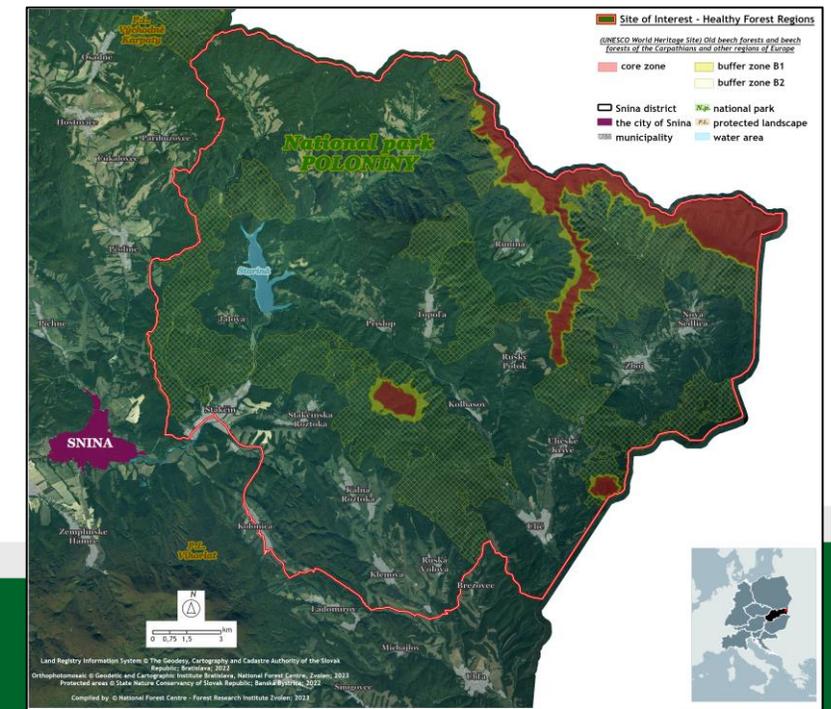
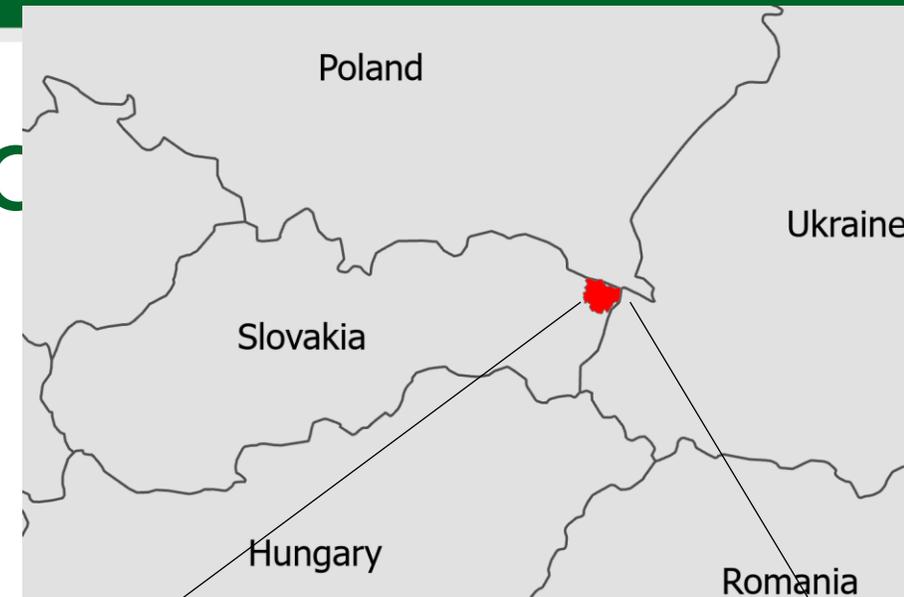
Methodology - general

- General methodology for Slovakia
1. Identification of FES and specification their indicators
 2. Collecting and processing input data
 3. Evaluation of indicators (FES) at forest stand level and relative scale
 4. Production outputs and result
 - Publications
 - Maps
 - Online FESWEB map application



Methodology – case study

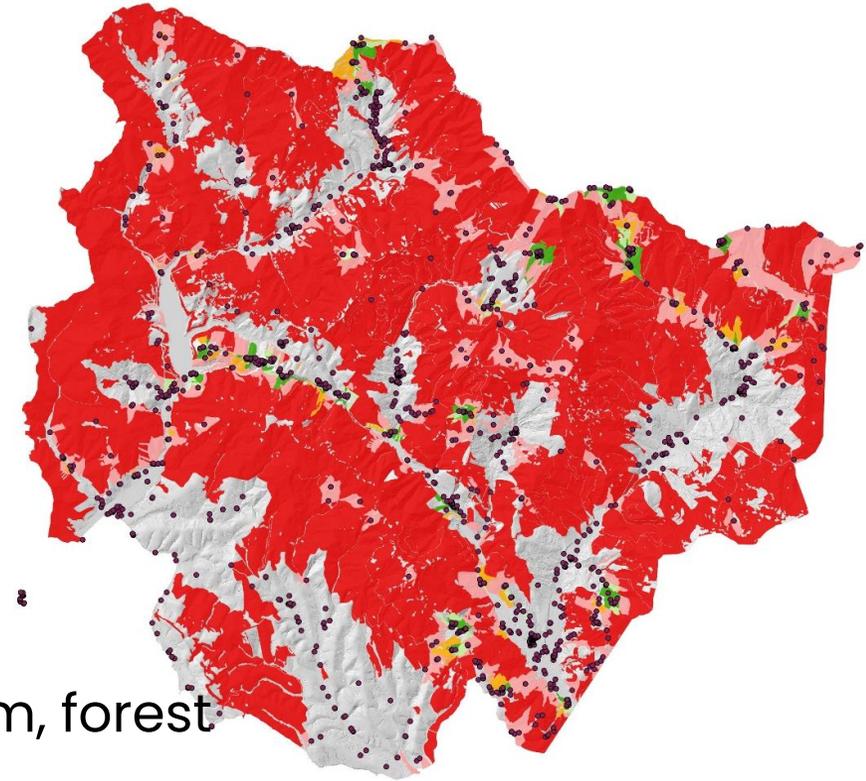
- Poloniny region
 - Eastern part of Slovakia (SK-PL-UA)
 - Area 46 000 ha (forest stands: 32 344 ha)
 - Beech forests – UNESCO Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe
- Nature protection
 - National Park – 70 %
 - The strictest level – 7 %



Methodology - data

- Input data

- data about forest stands and forest land
- published information
- localization of recreational infrastructure
 - OpenStreetMap
 - Slovak GIS database (ZB GIS)
 - Forestry information system
 - Own mapping by FESMAP application – 1548 tourism, forest management and game objects and routes
 - Localization, type of object (positive/negative effect, significance for recreation)
 - Spatial analysis to evaluate impact of objects to forest stands



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atinská kotlina, Detvianska kotlina, Rohy								HB 20	19	20	



OpenStreetMap

ZBGIS®



ArcGIS® Field Maps



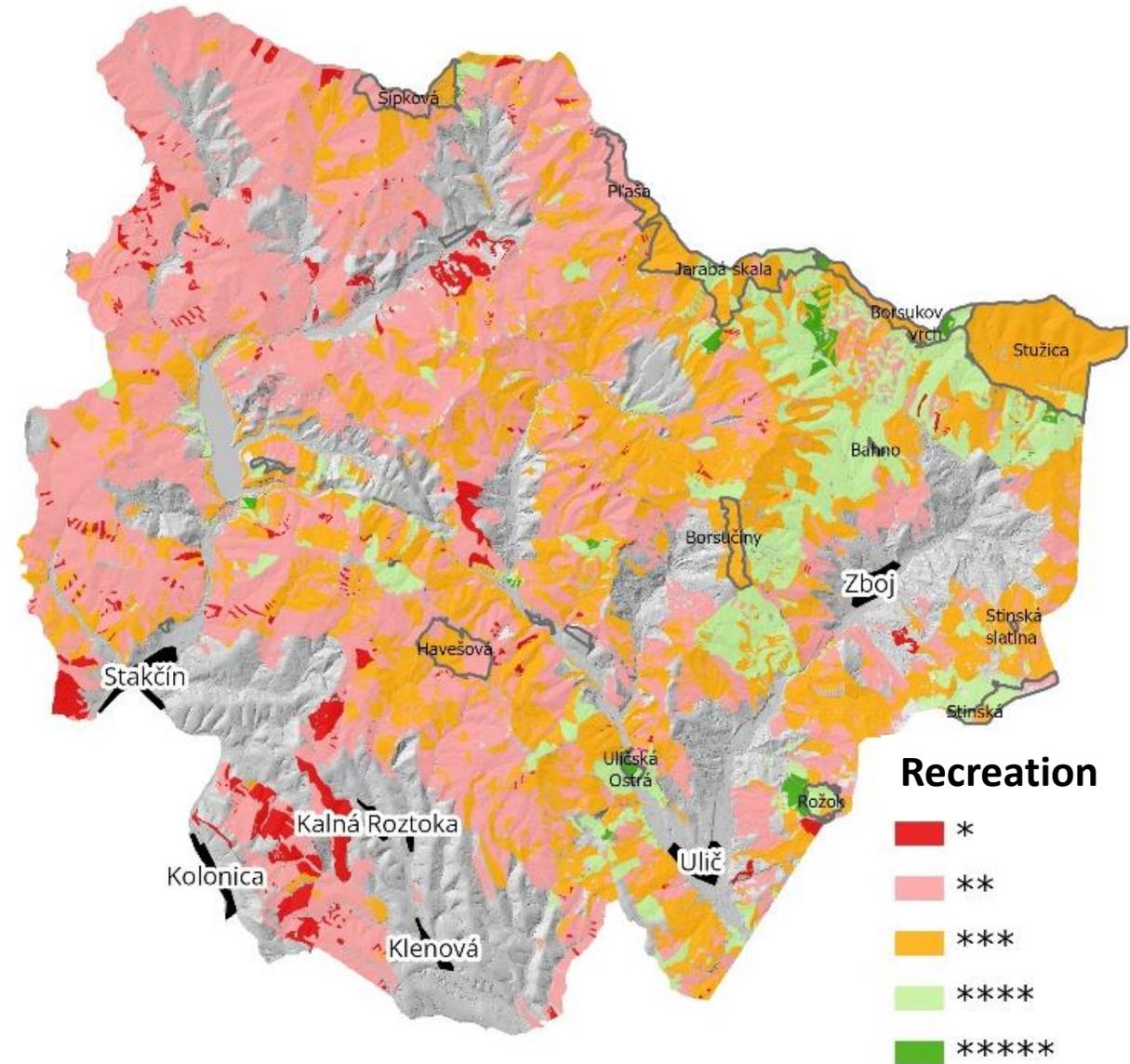
Methodology - evaluation

- 22 indicators classified to 4 dimensions
 - Environment
 - Localization and movement in the forest, Visibility within and to the forest stand
 - Forest Appearance
 - Aesthetics, wildness, tree species composition
 - Forest Management
 - Support level of recreational services, aesthetics by management
 - Technical Infrastructure in the forest and its surroundings
 - Support level of tourism, game management and other recreational services



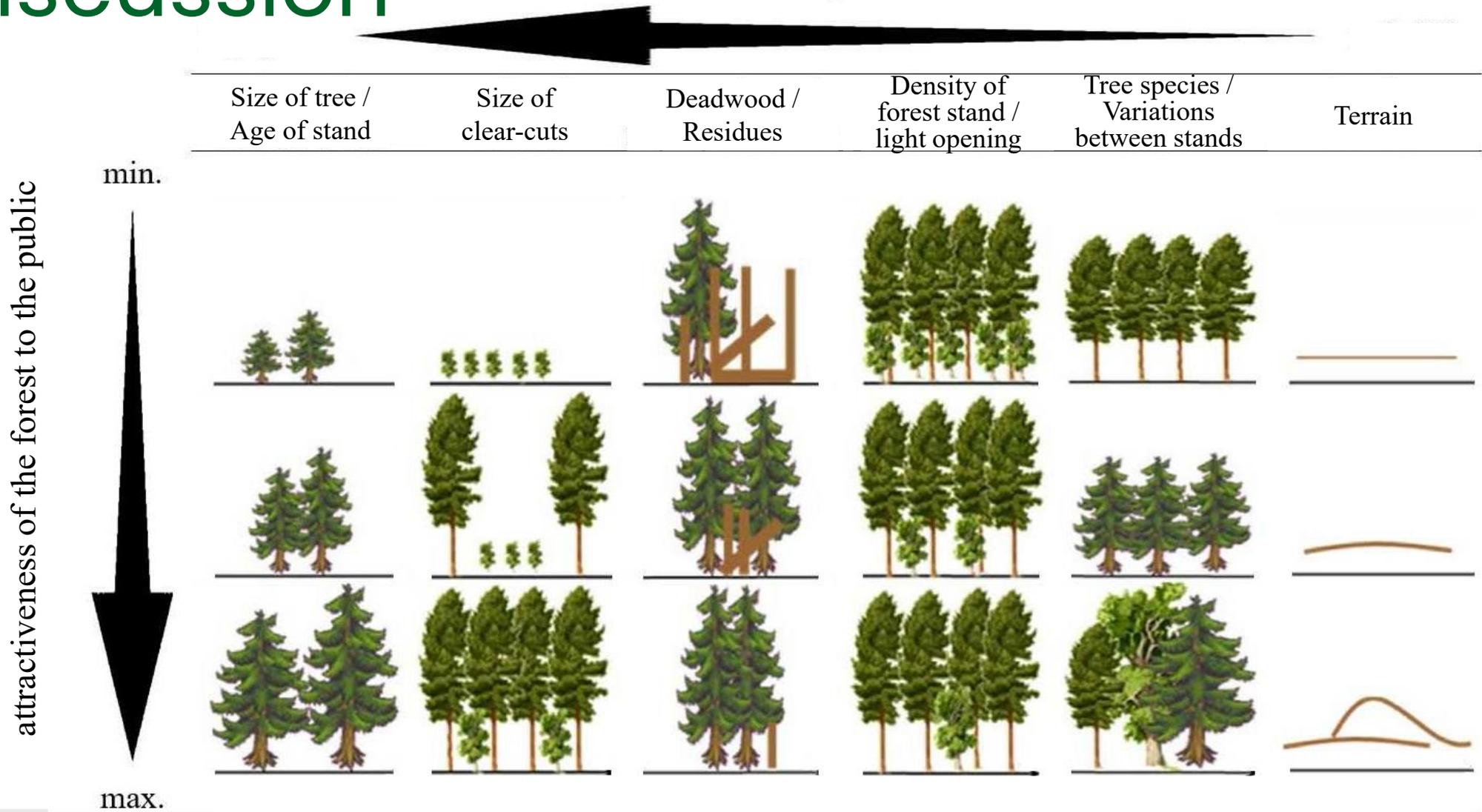
Results

- Results of evaluation are represented by relative values for forest stands in Poloniny region
 - Likert scale – 5 classes (from very low* to excellent***** level/potential)
- **Overall relative value of potential provisioning of recreational FES**
 - **0,42 *****
- Maps for better spatial interpretation of results



Discussion

Importance of forest structures for recreation



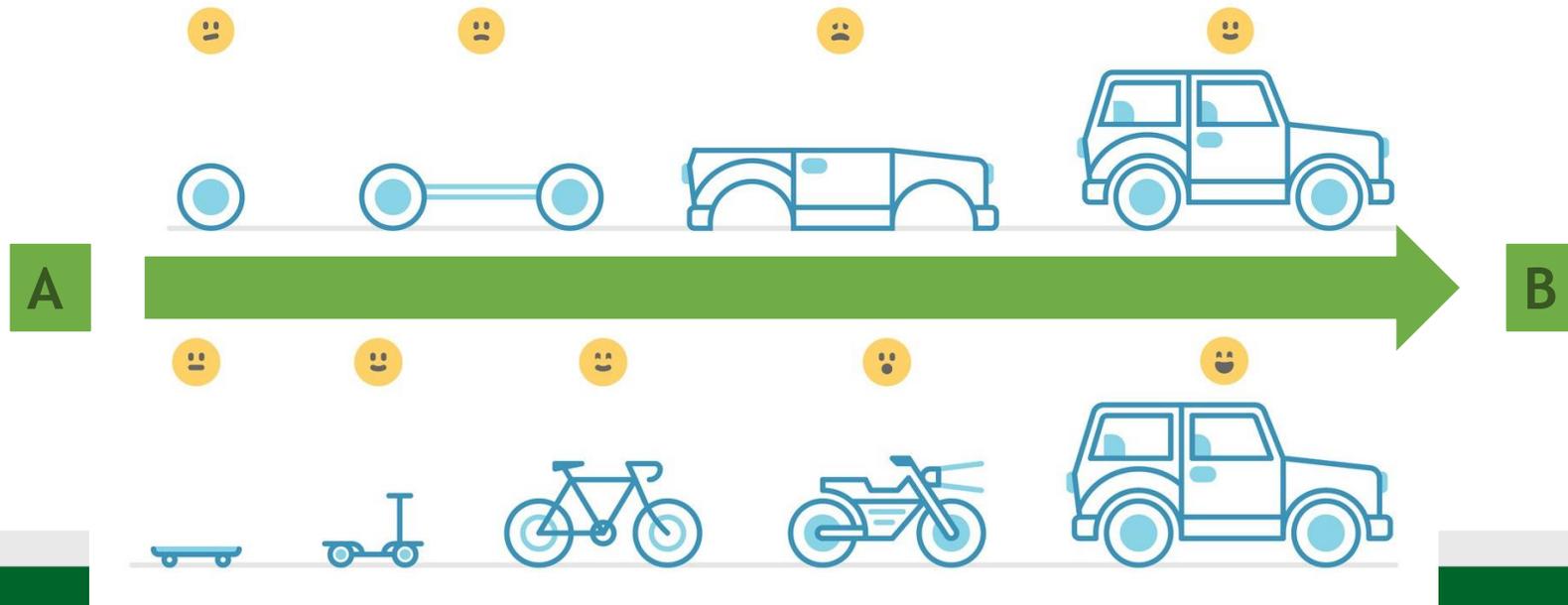
(adapted by Jaloviar and Kucbel 2024 from Ciesielski, Stereńczak 2018)



NÁRODNÉ
LESNÍCKE
CENTRUM

Discussion

- Limits of the public surveys, expert opinions and chosen indicators
- Availability of data from terrain (mapping of infrastructure)
- Time limit for validity of forest management evidence
- Permanent interactive improvement of the evaluation model



Conclusion

- Recreation is a key cultural ecosystem service, that reflects high societal demand for forests.
- Enhancing recreation requires targeted management: infrastructure, accessibility, and facility maintenance.
- Recreation can be assessed individually or as part of a package, making it potentially interesting for PES schemes.
- A validated methodology forms the basis of a **national-scale WebMap application** for visualizing the potential of forest ecosystem services



Thank you for your attention!



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This work was supported by the Slovak Research and Development Agency under the Contract no. APVV-21-0290 and APVV-20-0408 and co-funded by the EU Interreg CE Project HealthyForestRegions.



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