

**Compilation of a set of criteria for identifying
"sacred forests" of high natural value:**
identification, testing, and analysis of usable data,
recommendations for practical use

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Reasons for dealing with this task

- Increased public awareness;
- European Union has several policies in place to protect and preserve old-growth forests;
- To support nature conservation authorities;
- WWF Hungary contracted us to develop a set of criteria that could be used to identify "sacred forests" of high natural value and local significance at the national level, to develop the necessary methodology, identify and test usable data, and make recommendations for the practical application of the sanctuary forest concept.

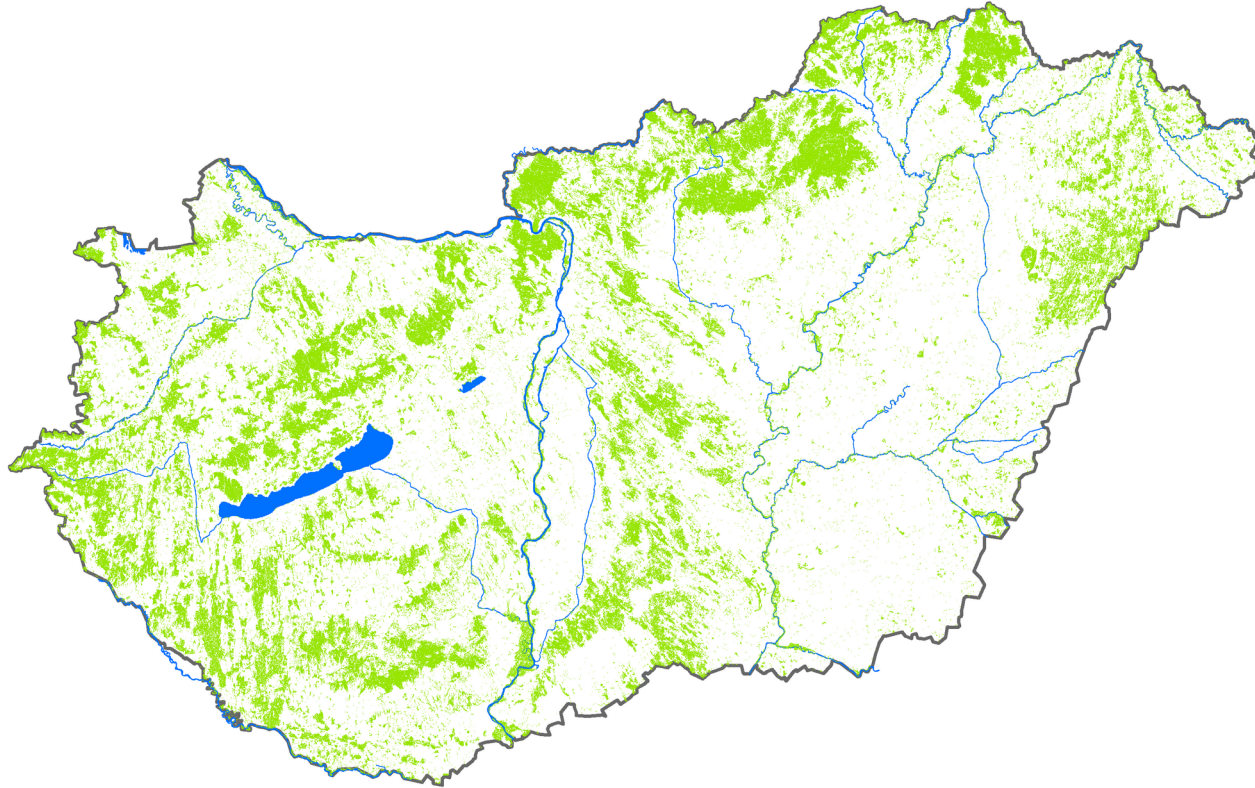
The applied approach

- Information that strictly reflects the condition of forests were examined separately from;
- Classifications that can be interpreted in terms of forest management (silvicultural system), nature conservation status, and management rights;
- National Forestry Database was an invaluable resource;
- Activities within The Hungarian Mapping and Assessment of Ecosystem Services Project (MAES-HU) resulted in a map of forest ecosystem types and an assesment of their condition;
- Additional information from i.e. national park personel was gathered.

The National Forestry Database (NFD)

- Two main objective:
 - monitoring necessary to forestry administration
 - storing data of the main attributes of Hungarian forests
- NFD is a spatial database covering all the 2 million hectares of Hungarian forests;
- NFD is updated annually. Field sampling supporting forest management planning takes place every ten years;
- NFD contains data about all the cc. 650.000 subcompartments, units of forest planning and management.

Forest cover in Hungary



0 25 50 100 Kilometers

NFD data we used for this project

	Variable	Details
Tree species composition	Avg. mixture ratio of tree species per canopy layer per subcompartment	- DBH $\geq$ 1 cm - 3 canopy layers, max. 100% cover per layer - Tree species under 5% mixture ratio are not detailed here
	List of tree species under 5% mixture ratio	
Forest structure	Avg. DBH per cohorts*	- In case of trees with DBH > 10 cm and height > 1,5 m
	Avg. age per cohorts*	- Weighted arithmetic mean of the canopy areas - More age cohorts when the age difference between components is larger than 25% of the cutting age (e.g., 20-30 yrs. difference in case of native forests)
	Shrub layer	Characterised by one of 5 categories: - Uniform, sparse cover, maximum 30% - Sparse cover with groups of shrubs, maximum 30% - Uniform, medium cover, 30-70% - Medium cover with groups of shrubs, 30-70% - Full cover > 70%

Forest condition assessment in MAES-HU Project

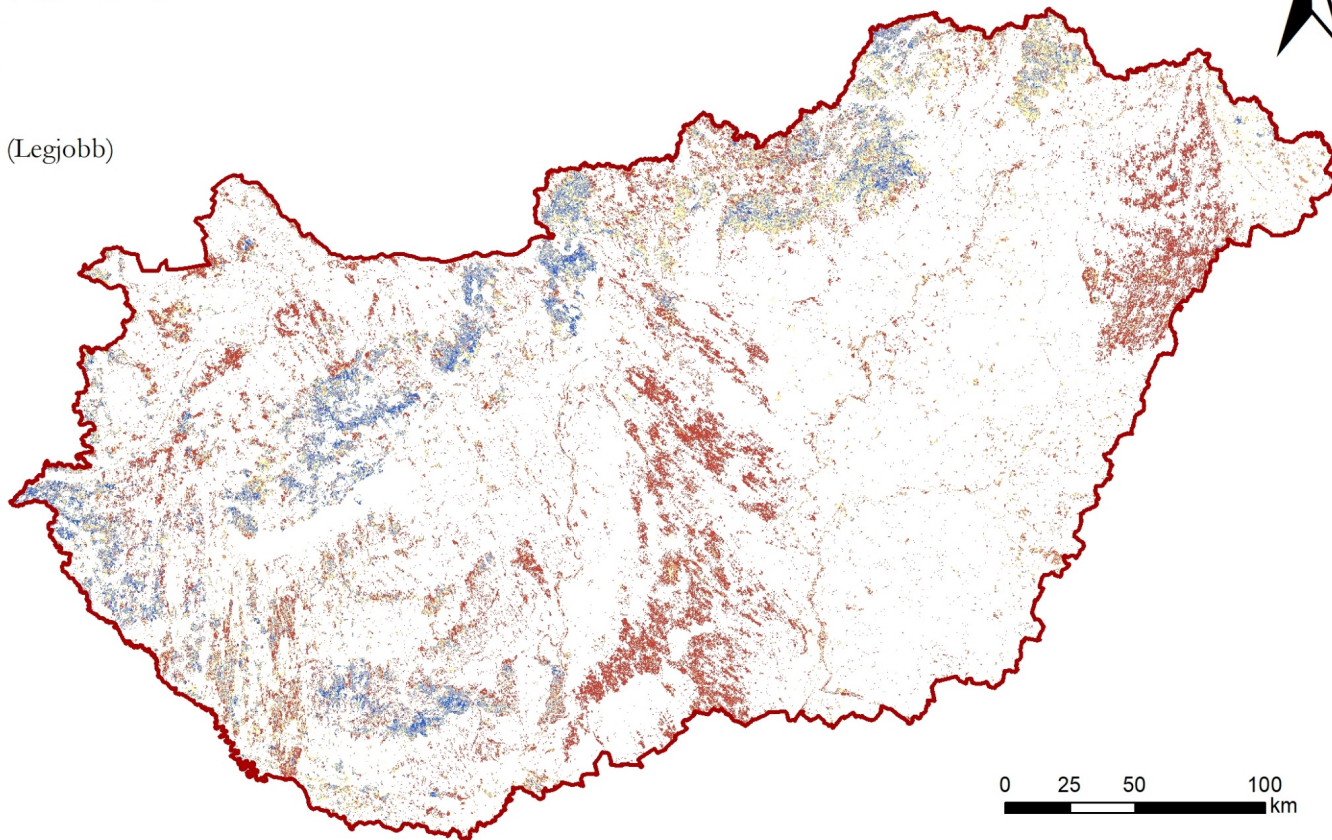
- Tree species composition and forest structure were assessed separately;
- Semi-natural and plantation forests were scored separately;
- Condition assessment was based on 15 indicators created from NFD data;
- Thresholds were established for each of the variables based on expert opinion;
- Habitat-dependent indicators were scored in relation to reference levels considered ideal for the ecosystem types included in the Ecosystem Map of Hungary;
- Final score = $1.5 \times \text{composition} + \text{structure}$ (max. 32.5)

	Semi-natural forests (not plantations)	Plantations
Composition	Number of regionally native admixing tree species	
Alsó és felső szint	Admixing ratio of tree species not native to the region	
	Admixing ratio of dominant tree species exceeds threshold for the forest type	Number of regionally native tree species
(maximum 13 points,	Admixing ratio of native tree species exceeds threshold for the forest type	Admixing ratio of regionally native tree species
maximum 9 points for plantations)	Admixing ratio of aggressive non-native tree species	Admixing ratio of aggressive non-native tree species
Structure	Number of age-classes (minimum 5 year difference)	
	Difference of minimum and maximum age > 30 years in the canopy layer	
(maximum 13 points)	Age of oldest cohort > 100 years	
	Number of dbh-classes	
	Diversity of dbh-classes (only where several dbh-classes occur)	
	Presence of large (> 50 cm dbh) trees	
	Shrub layer	

5-fokozatú összevont
minősítés eredménye

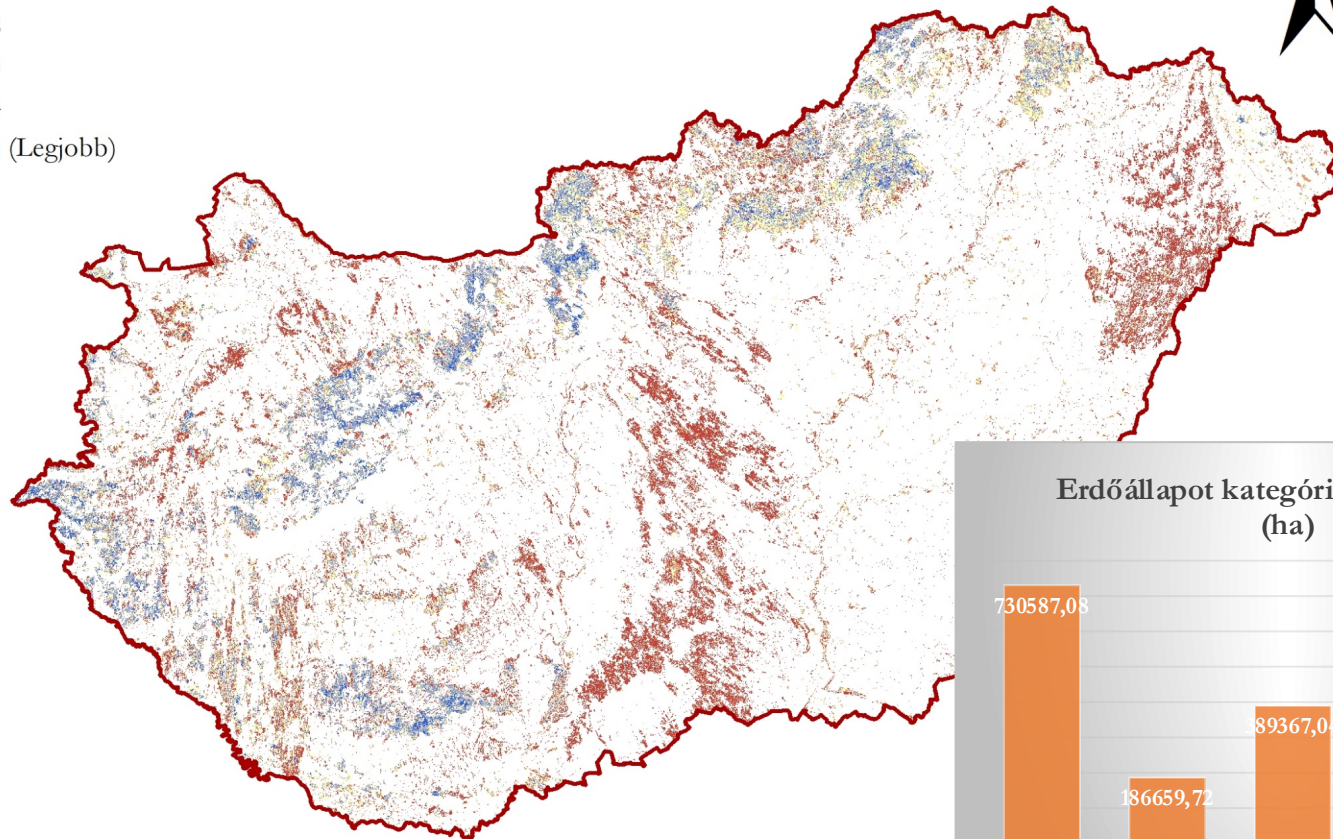
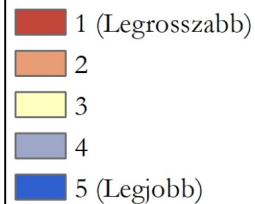
MAES-HU condition categories: SUM

- 1 (Legrosszabb)
- 2
- 3
- 4
- 5 (Legjobb)

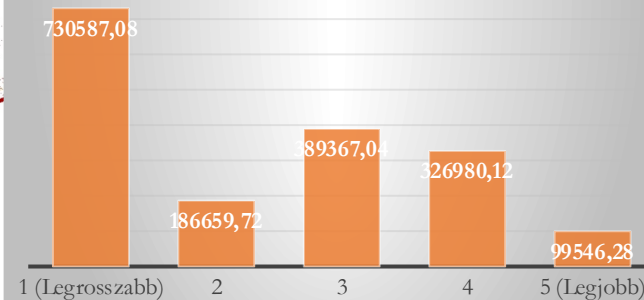


5-fokozatú összevont
minősítés eredménye

MAES-HU condition categories: COMPOSTION

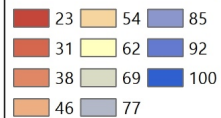


Erdőállapot kategóriák összterület
(ha)

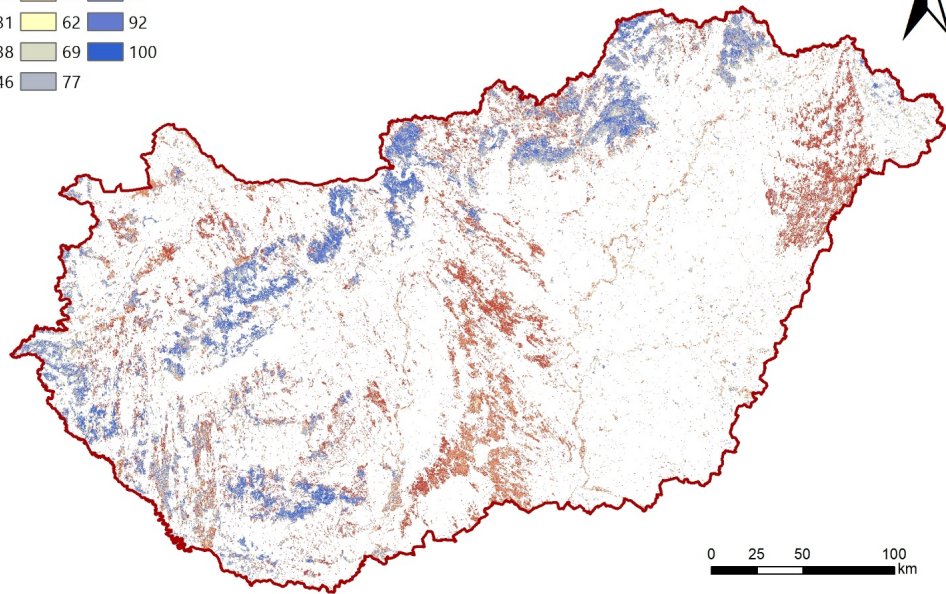


Fajösszetétel indikátorcsoport
(maximum érték %-a)

MAES-HU condition categories: COMPOSTION

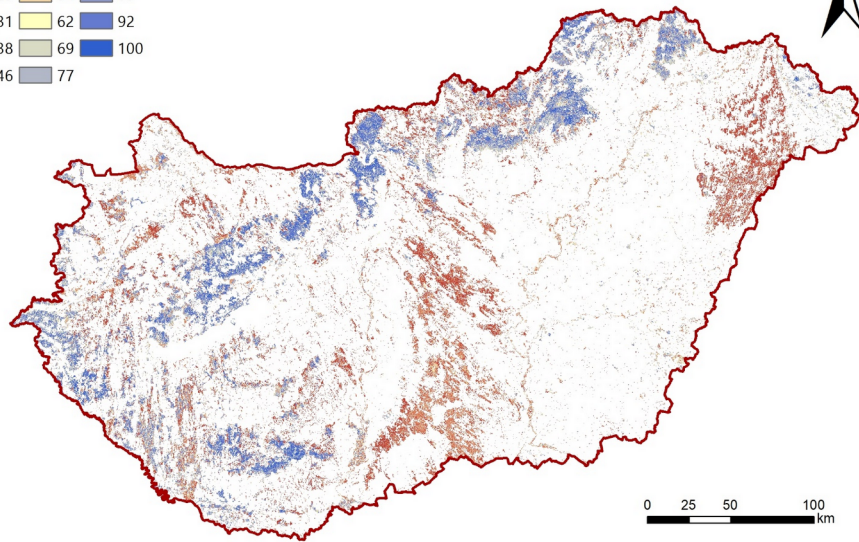
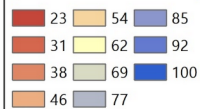


0 25 50 100
km



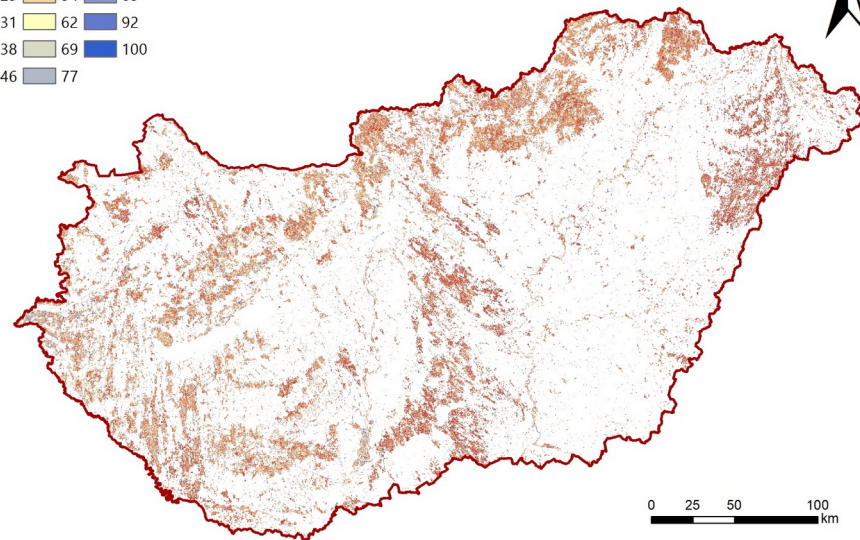
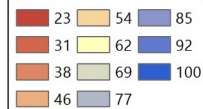
Fajösszetétel indikátorcsoport
(maximum érték %-a)

MAES-HU condition categories: COMPOSTION



Faállomány-szerkezet indikátorcsoport
(maximum érték %-a)

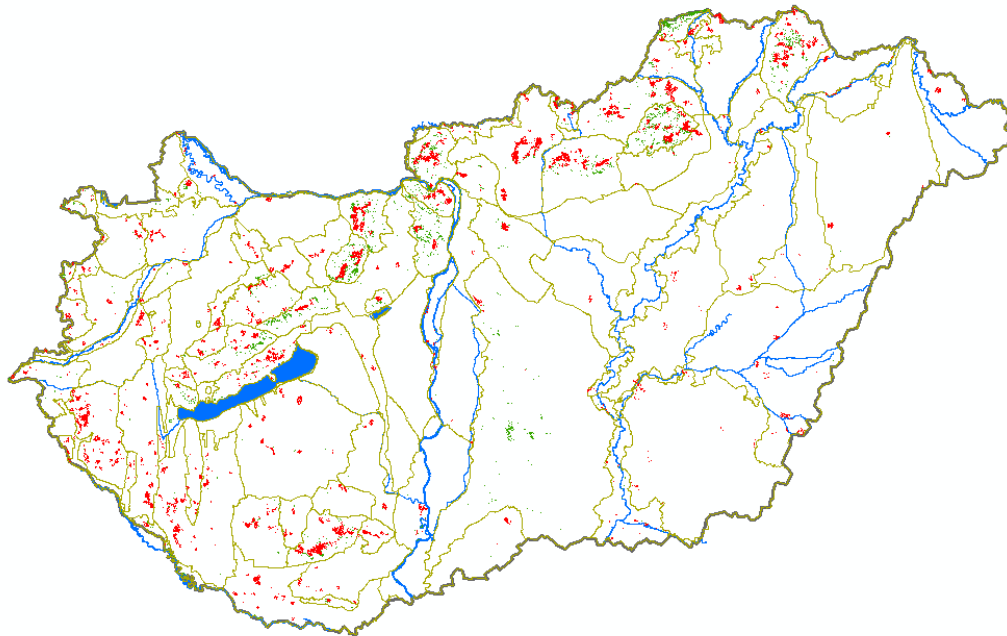
MAES-HU condition categories: STRUCTURE



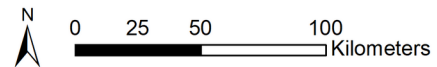
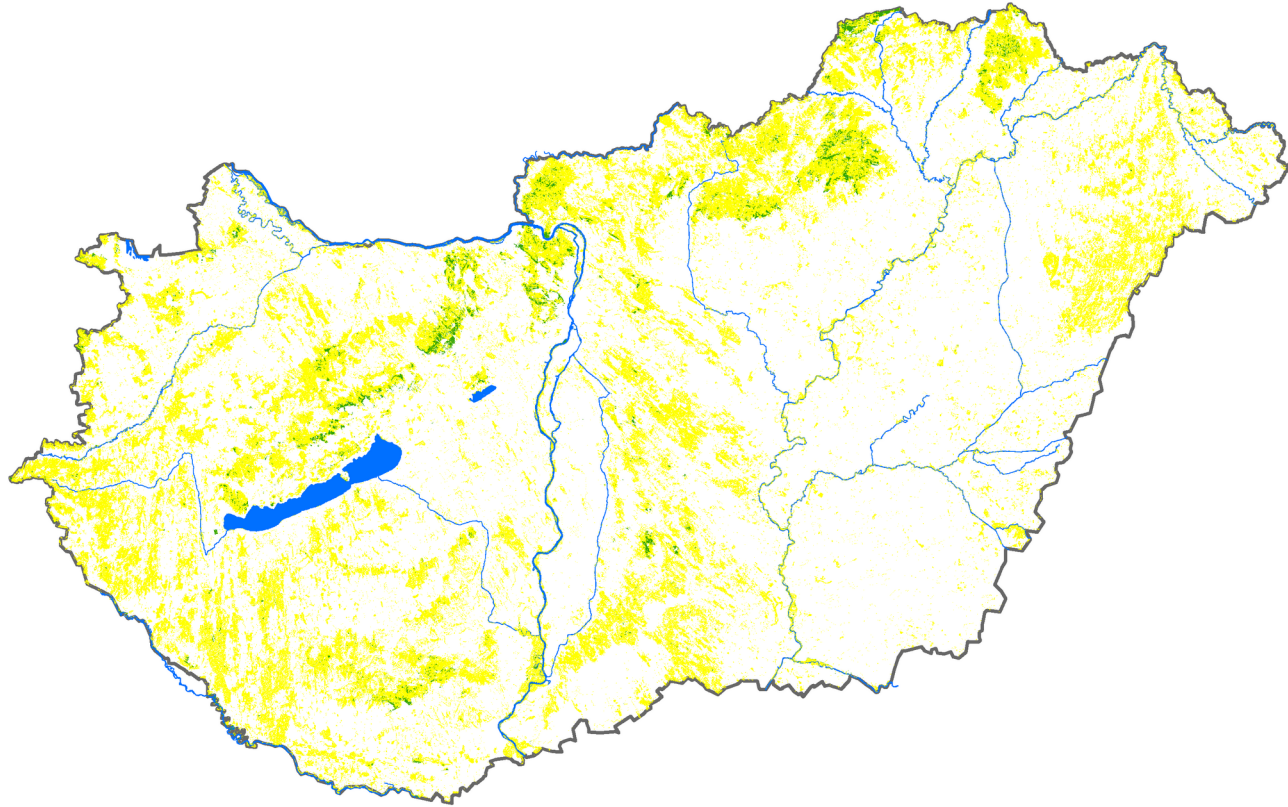
The applied approach in the WWF Project

- Using a query based on NFD data;
- Fine-tuning based on the MAES-HU condition assessment;
- Weighing by using other sources of administrative and expert knowledge information;
- Applying hotspot analysis to create larger blocks and to take into account local/regional importance;
- Creating a complex geodatabase with all of this information.

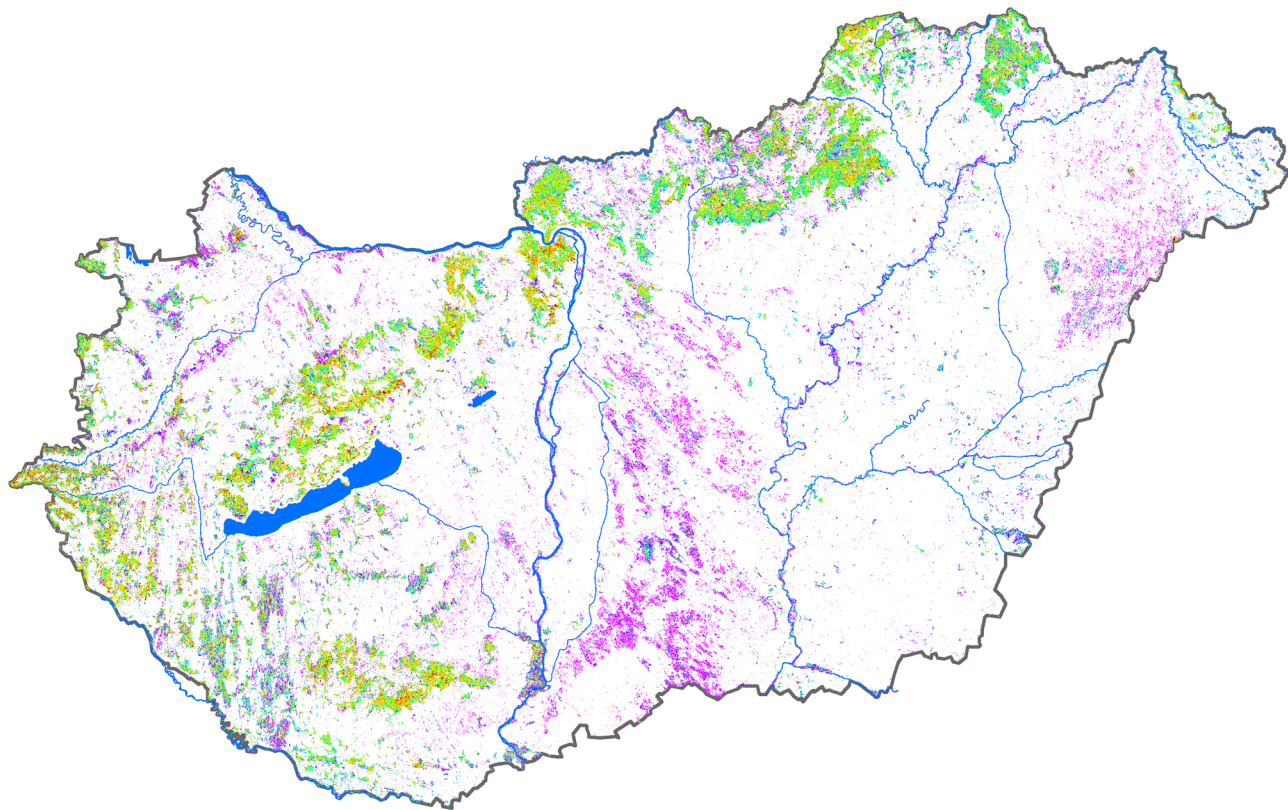
Layers
☐ Sacred forests
0
☒ 1
☒ Hotspots
Not hotspot
Hotspot
☒ FANE_1_3
0
☒ 1
☐ NOSZTÉP SUM
☐ ER_518e_Vedettseggel_IO
☐
☒ Forest region
☐ Forest cover
☒ Vízrajz
☒ Country border



Administrative selection tool

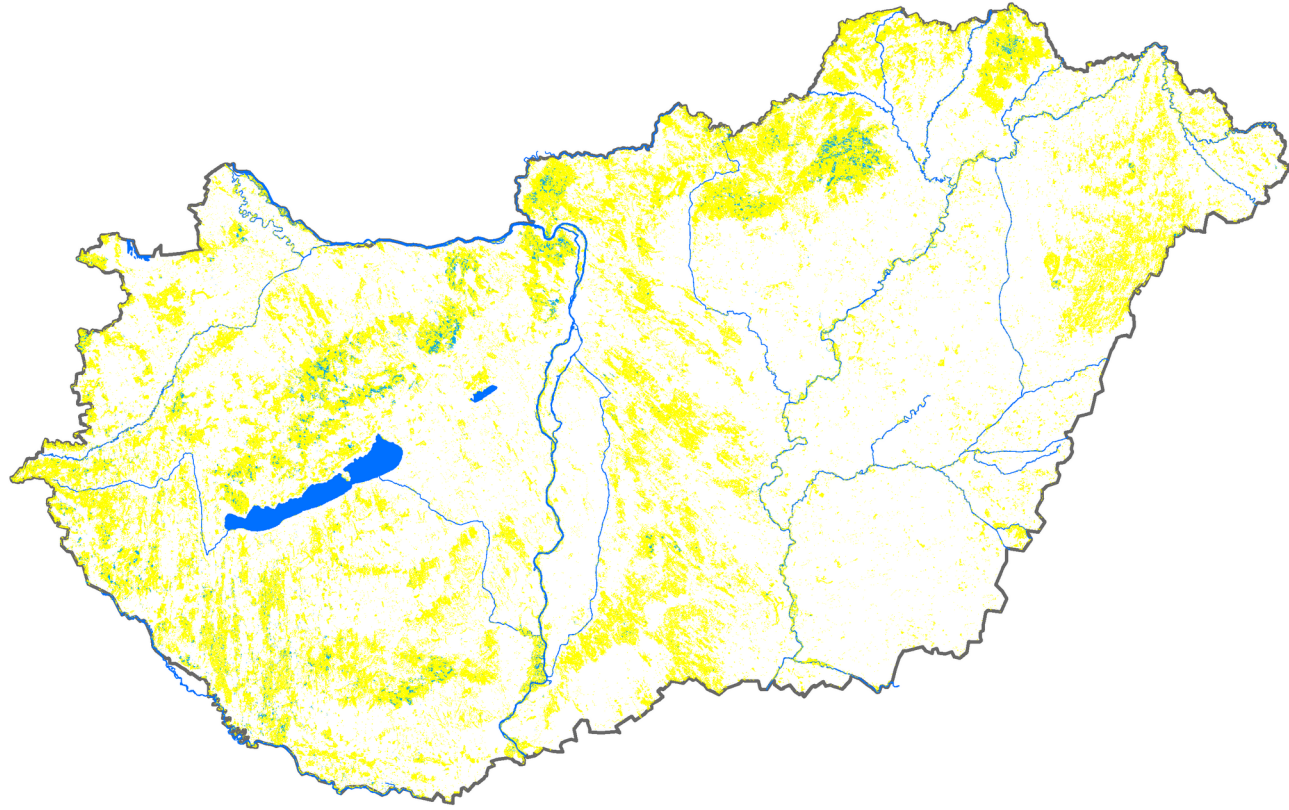


MAES-HU condition scores



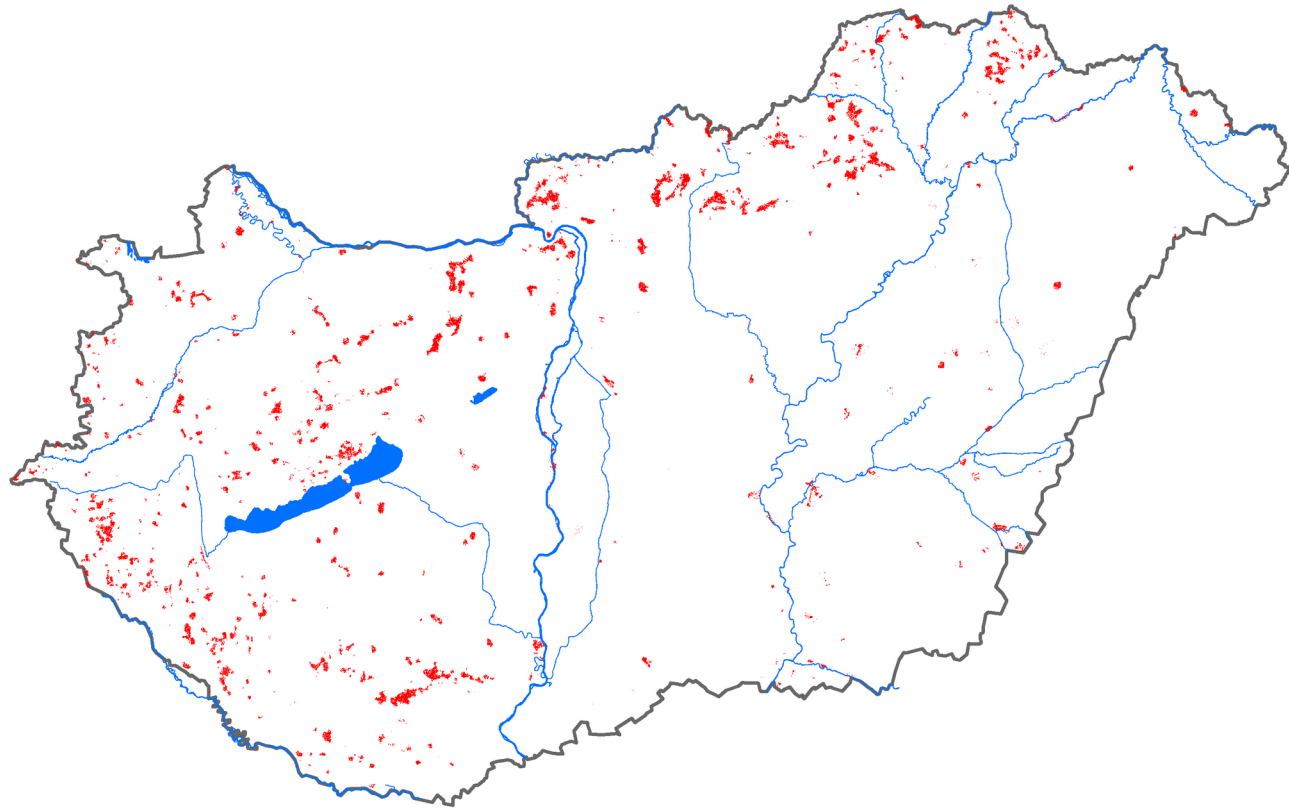
0 25 50 100
Kilometers

Selected sacred forests



0 25 50 100
Kilometers

Hotspots of HCV forests



0 25 50 100
Kilometers

