

University of Sopron  
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Thesis booklet of doctoral (PhD) dissertation

**Analysing Changes and Character of the Órség  
Landscape**

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## Aims of the dissertation, research questions

The research reveals the character of the Órség landscape and presents the changes of its land cover from the mid-18<sup>th</sup> century till today, emphasising the impacts of the border defined in 1920 on the landscape and its character. The relevance of the topic is given by the tasks arising from the European Landscape Convention and from the actual Landscape Strategy of Hungary (2017-2026), where identifying landscapes and analysing their characters have advanced significance ([Council of Europe 2000](#); [FM 2017](#)). The research was done between the birth of these two important documents, mainly within the scope of the TransEcoNet international project aiming to develop and manage the ecological network. The research aims to provide information for the preservation, management and planning activities of this highly valued, unique landscape.

Research questions are the following:

Borders of the landscape:

- ♦ Where does the border of Órség lie according to local people and the scientific literature?
- ♦ Has the political border influenced the conception of the local people about the borders of Órség?

Character of the Órség landscape:

- ♦ What are the characteristics of the Órség landscape in the views of local people and experts?
- ♦ Are there any relations between the borders of the character units and the conceptions of the local people about the borders of Órség?

Changes of the landscape:

- ♦ How have the land cover and the pattern of the landscape changed?
- ♦ How do local people consider changes of the landscape?

Role of the national borders in forming the character and the changes of the landscape:

- ♦ Does the character of the present and the past landscapes differ on the Hungarian and the Slovenian side of the border?
- ♦ What are the reasons for the differences appearing in the present character of the landscape?

## Materials and methods

The main principle of the research area was the historical Őrség embracing 18 settlements that received privileges for defending the frontier ([Beluszky 2005](#)) (Figure 1).

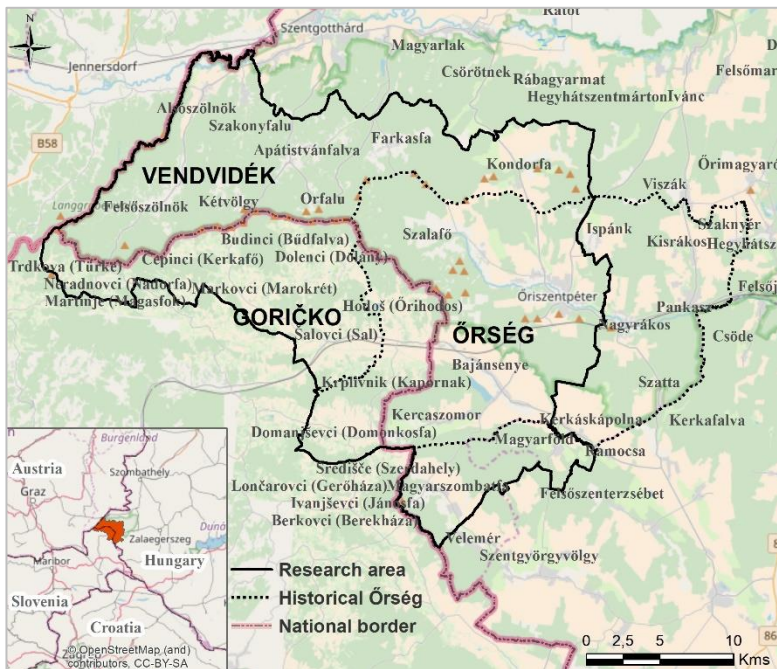


Figure 1: Situation of the research area. Base map: OpenStreetMap

Further principles of the definition of the research area were the comparability of the Hungarian and the Slovenian sides of the border. This led me to determine the width of the research area in two settlements along the Slovenian-Hungarian border. The area contains three landscapes: Órség, Vendvidék and the Slovenian Goričko. The whole area is characterized by significant forest cover (65%) and rich in natural and cultural elements. Both sides of the border are under nature protection.

Landscape changes are revealed mainly through historical map processing. During map-processing, military surveys were analysed (Table 1). An orthophoto from 2008 was the source of actual land cover information for Hungary, and Google Earth images were the source of actual land cover information for Slovenia.

	Territories of Hungary	Territories of Slovenia
1st time layer (1784-1785)	First Military Survey (1784-1785): 1:28 800	
2nd time layer (1853-1855)	Second Military Survey (1853-1855): 1:28 800	
3rd time layer (1878-1879)	Third Military Survey (1878-1879): 1:25 000	
4th time layer (1945-1956)	New Survey (1956): 1:25 000	<ul style="list-style-type: none"> <li>• 1941 topo. m.: 1:50 000 (1%)</li> <li>• 1945 topo. m.: 1:25 000 (34%)</li> <li>• 1949 topo. m.: 1:50 000 (29%)</li> <li>• 1952 topo. m.: 1: 50 000, corrected with use of areal photos from 1954 (36%)</li> </ul>
5th time layer (2000-2008)	<ul style="list-style-type: none"> <li>• Orthophoto (2008) (99%)</li> <li>• Google Earth Pro (2000-2008) (1%)</li> </ul>	Google Earth Pro (2000-2016)

*Table 1: Maps and aerial photographs used in the landscape change analyses on the Hungarian and the Slovenian side of the border*

During map processing, land cover information was recorded as a vector layer with a three-level category system ([Konkoly-Gyuró et al. 2011](#)). Land cover maps were checked thematically and geometrically. Then they were analysed through column charts and transitions matrices, which clearly show the transformations of the

land cover categories between the two maps. Beside classical statistical solutions, trajectory analysis was applied, which made it possible to analyse and typify the changes simultaneously for the whole time period ([Skokanová 2009](#)).

Landscape change information derived from historical maps, scientific literature, statistics, and contemporary photographs were supplemented by further information derived from interviews with local, mostly elderly people. Before each conversation, interviewees indicated the borders of the Órség on a sketch map. These “mental maps” provide information about the landscape borders living in the mind of the interviewees. These borders can be compared to the results of the landscape character assessment (LCA). The character of the landscape was revealed through the method developed and applied for the Fertő-Hanság region ([Konkoly-Gyuró et al. 2010](#)), which is based on the methodology of [Swanwick - Land Use Consultants \(2002\)](#). This method combines geoinformatic analyses and field surveys. Geoinformatic processing is based on complex attributes of the three basic properties of the landscape (relief, human impact, land cover dominance), in which information from field surveys is integrated. Character types of the landscape can be distinguished on the basis of these three complex properties.

## Theses derived from results

### *1. Borders of the Órség based on the mental maps*

The borders of the historical Órség are considered as the actual landscape border according to statements of local interviewees. However, on the mental maps they differ from this (Figure Figure 2).

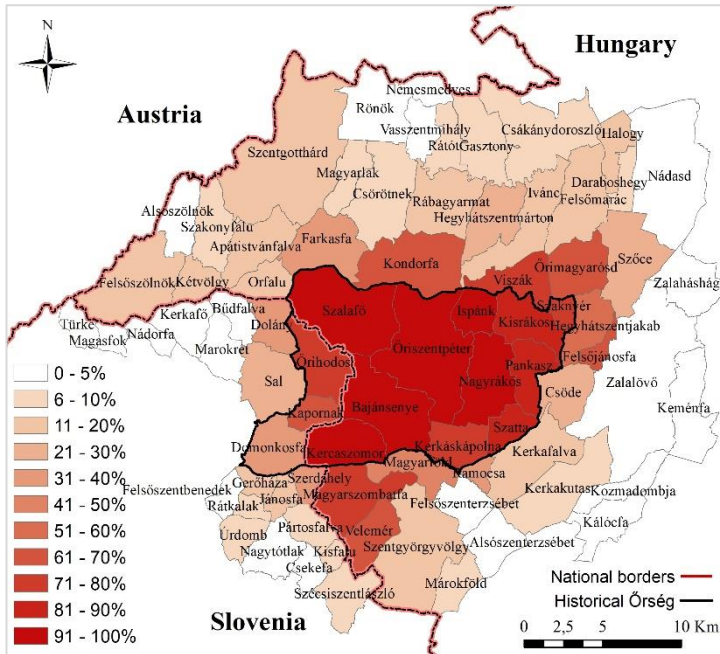


Figure 2: Settlements of Órség identified by the interviewees

The Hungarian-Slovenian border divides the historical Órség and it also divides the opinion of the interviewees about the present boundary of the Órség. However, according to the mental maps, there are settlements among the former privileged villages situated today in Slovenia that are considered as Órség by only one third of the interviewees. Simultaneously, according to the mental maps, the area of the Órség on the Hungarian side of the border extends much further than the historical Órség. The reason for this might be found in the former administrative units (Órség district, and Óriszentpéter district), which included settlements also outside the historical Órség. Step by step these units have built into the mind of the people, so it can be that Magyarzombatfa and Velemér situated south of the historical Órség, and also Viskák and Órimagyarósd lying north-east are an organic part of the Órség according to the interviewees.

## 2. Character of the landscape

The character of the present Órség landscape is not homogeneous. It consists of more character types on both sides of the Slovenian-Hungarian border (Figure 3).

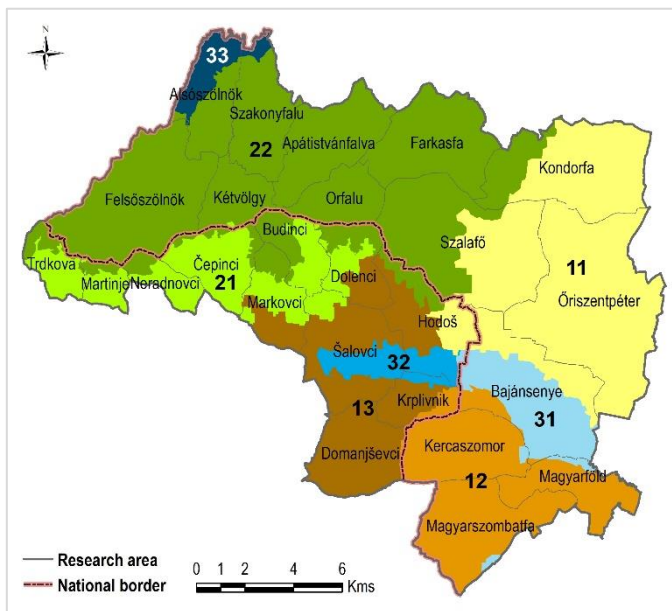


Figure 3: Landscape character types of the research area

Character types differ from each other in their relief, land cover, usage intensity and settlement structure properties. Today, the political border also represents a boundary in the landscape, in which the accelerating afforestation and the consolidation of agricultural holdings in Hungary during the 20th century played a significant part and caused visible differences on the two sides of the border.

Factors particularly endangering the uniqueness of the Órség landscape are the transformation of the mosaic-like landscape, which can be brought into connection with abandoning grasslands and arable lands and also with expanding forest areas. Further negative tendencies are the abandonment of orchards and the disappearance



of traditional the architectural style and local settlement structure called “szer”.

### 3. Land cover information of the First Military Survey in Órség

The First Military Survey was compared to a contemporary map to validate proportion of grassland-arable land to forests (Table Table 2).

Land cover type	Proportion (%) First Military Survey 1784	Proportion (%) Kenedics's map 1785	Difference in proportion (%)
Urban fabric	9.59	4.90	-4.69
Arable land	56.61	49.86	-6.74
Vineyard, orchard	6.05	1.53	-4.52
Forest	20.92	34.49	13.57
Grassland	2.81	6.08	3.27
Wetland	0.48		-0.48
Open water surface	2.43	3.14	0.71
Bare surface, other	0.65		-0.65

*Table 2: Cross-check of land cover information of the Csörötnek settlement in 1784 and 1785*

The reason for the significant differences could be the different scale, the georeferencing difficulties and the thematic inaccuracy of the military survey. Based on the analyses the real proportion of the most questionable grassland category could be double of the area represented on the military map. Certain grasslands might have been surveyed as arable lands.

#### 4. Land cover change in Órség between 1784 and 2008

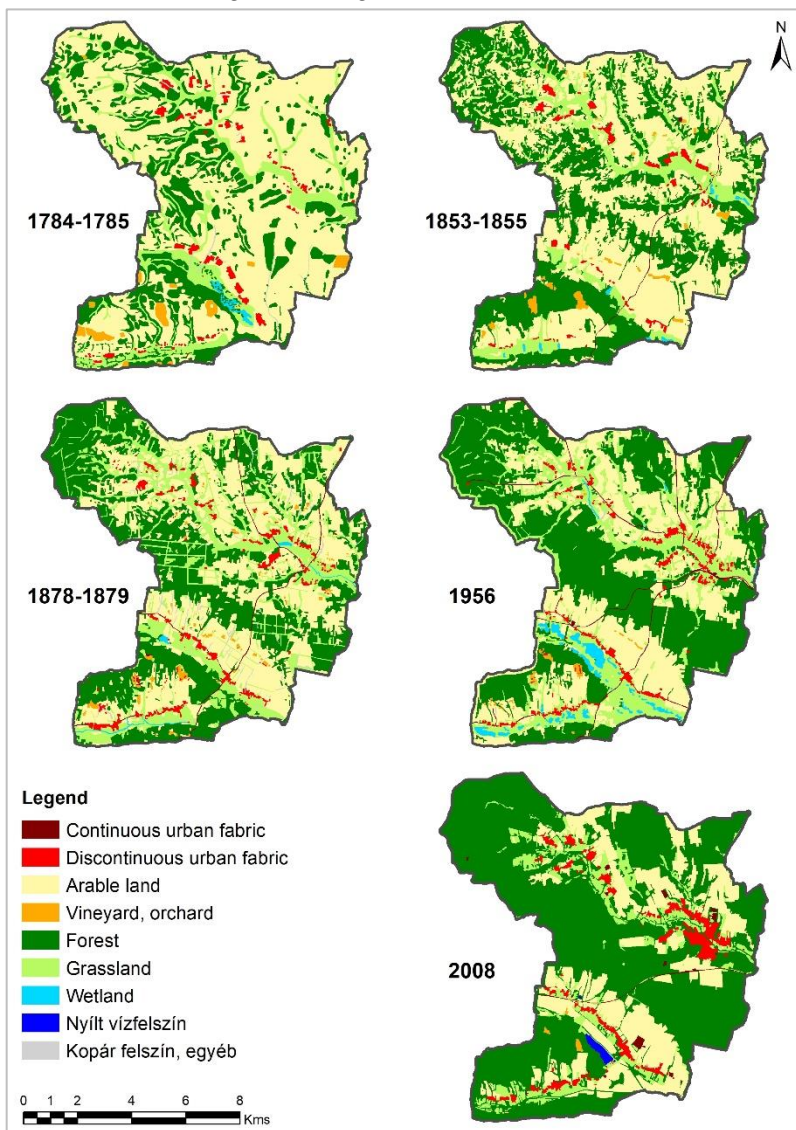


Figure 4: Land cover change of the territory identified as Órség by 90% of the interviewees

According to the land cover analyses of the Órség sample site including four settlements (Szalafő, Óriszentpéter, Bajánsenye and Kercaszomor), the area has changed a lot during the past two hundred plus years (Figures Figure 4:-Figure 5).

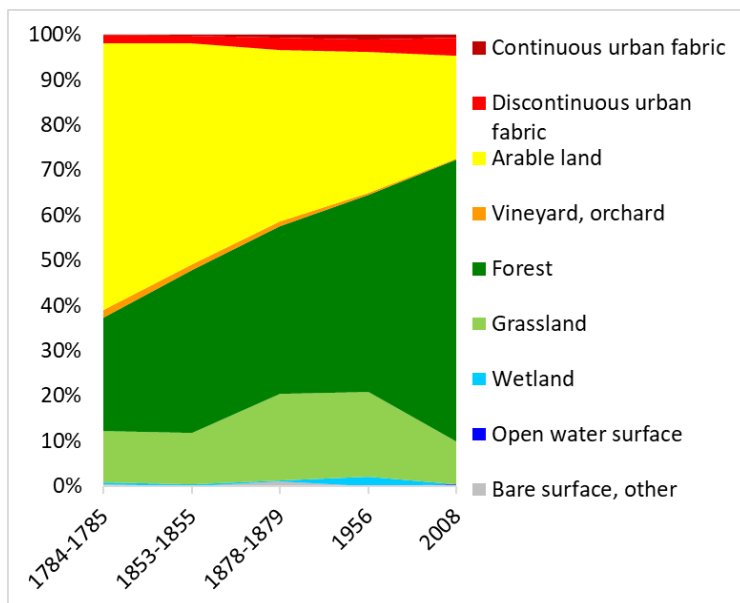


Figure 5: Land cover change of the territory identified as Órség by 90% of the interviewees

Decreasing proportion of arable lands (59.1%→22.8%) and expanding forest areas (25.3%→62.3%) give the most relevant changes. The proportions of these two land cover categories were reversed during the period under survey. Besides these tendencies, the proportions of grasslands (19%→9.6%) vineyards, and orchards outside of the settlements (1.5%→0.2%) have decreased. First, arable lands and grasslands situated far from the settlements mostly at higher elevation have been replaced by forests. Parallel with expanding forests, the mosaic-like structure of the landscape has been reduced, which is indicated by the decrease of the length of

edges between forest and non-forested surfaces. Today, only 57% of the length of edges of the mid-19th century can be detected.

#### 5. Typifying land cover changes on the two sides of the frontier

Stable trajectories on the Hungarian side (19.4%) have a greater proportion than the Slovenian side of the border (Table 3). Stable areas are forests and arable lands in both countries. The most significant differences among areas with stable trajectories are the proportion of continuous grassland cover in Hungary (1.7%) which is much greater compared to the Slovenian value (0.1%). Territories lying at lower elevations show higher dynamics in both countries: in Slovenia stable trajectories are clearly situated at higher elevations.

Change trajectories	Territories of Hungary			Territories of Slovenia		
	km <sup>2</sup>	%	Average m a.s.l. (m)	km <sup>2</sup>	%	Average m a.s.l. (m)
Stable	44.4	19.4%	285	11.9	13.5%	308
Quasi-stable	77.4	33.9%	284	28.8	32.5%	304
Stepped	17.9	7.8%	281	5.3	6.0%	302
Cyclical	14.8	6.5%	282	7.6	8.6%	305
Dynamic	41.4	18.1%	273	20.4	23.0%	291
With no constant trend	32.6	14.3%	273	14.6	16.5%	293

*Table 3: Land cover change trajectories (extent, proportion and average elevation in metres above sea level) of the Hungarian and the Slovenian territories between 1784 and 2008*

#### 6. Role of the frontier in the landscape change

Proportion and configuration of the land cover of the areas situated at lower elevations were homogenous before the new national border was defined by the Treaty of Trianon. The proportion of arable lands remained higher by the mid-20th century on the Yugoslav side compared to the Hungarian side of the border. Today, arable lands differ in their configuration in both countries. On the Hungarian side, we can see arable lands with greater plots at every elevation thanks to their consolidation, while in Slovenia tiny parcels have remained. Unity in the Kerka-valley also remained in the mid-

20th century owing to the intense agricultural utilization in both countries. However, on the Slovenian side, arable lands were characterized by a much higher intensity of usage. There is a smaller proportion of grasslands, and built-up areas (mainly transportation infrastructure) have significantly increased, which resulted in a different landscape character.

## Conclusions, suggestions

During the last circa 250 years, the Órség landscape has shown expressive changes. Among these changes, the large-scale expansion of forest areas can be highlighted. According to the National Forest Strategy (2016-2030), increasing the forest areas of Hungary is a strategic goal ([FM 2016](#)). However, a further increase of the forest cover of Órség is undesirable because it could lead to the loss of the remaining mosaic-like landscape structure.

Results of the landscape character assessment can contribute to a regional or nation-wide analysis besides the utilization at local level. Through LCA executed on a larger area, the landscape character types are clearly distinguishable. Based on their unique occurrence, landscape character areas could be determined, among them an individual Órség landscape character area.

Beside the analyses presented in this research, the generated digital historical map series can be used by other researchers in additional studies. Among others, the dynamics of land cover changes can be cross-checked with present nature protection areas or with point-map of valuable plant species. Such investigations could give us an answer to the question of how species indicate the stability or continuity of the land cover of a given habitat.

Land cover maps together with meteorological data can be used for analyses of climate change. Local scale analyses can be made using the more detailed land cover category system.

Inserting further land cover maps into the map series analysis can be refined. In the first place 20th century maps are needed, to fill

the approximately 50-60 year gap between the maps. New time layers could contribute to a more detailed analysis of the accelerated tendencies of the 20th century, caused by the rapid development of agricultural and transportation technology and the increased usage intensity.

Through a more accurate land cover map, satellite imagery or aerial photography monitoring land cover would be possible, to analyse further changes of the landscape. Fundamentally, interviewees considered the Órség landscape as positive. It is also clear, that they are very fond of it. However, local people consider landscape changes to be negative. In their opinion, everything was better in the old times, and by today everything has turned in a bad direction. This highlights the future planning directions. What they consider as ideal should be established, and what remains of this should be preserved. This is possible, since the local people's devotion to their landscape and their love of nature are the greatest in Órség. Building upon this, the heritage preserved by the Órség landscape through centuries could live on through the contribution of the inhabitants of the settlements on both sides of the Slovenian-Hungarian border and nature protection authorities.

## Publications associated with the dissertation

### *Reviewed journal articles*

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