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Evaluation of the landscape potential for recreation and tourism on the example of microregion Minčol (Slovakia)

The article is devoted to the evaluation of the landscape potential for recreation and tourism. Natural conditions influencing the development of recreation and tourism were generally analyzed, and then, this knowledge was applied to a specific territory - Microregion Minčol in Slovakia. The methodology of work is based on the selection of criteria needed to assess the landscape potential for recreation and tourism. Area of microregion was then divided using a square grid. In each square, individual criteria point values were counted. On this basis, the area of microregion was divided into five degrees of suitability for recreation and tourism.

Keywords: the landscape potential for recreation and tourism, natural condition, landscape evaluation, landscape potential, microregion Minčol

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Introduction

The landscape offers material resources, which are often used excessively by man. It is vital to use these resources only to such an extent so no irreversible changes in landscape occur, based on sustainable development for a future generation. Landscape meets all human needs, provides humans with minerals, space for existence, recreation, rest etc. When assessing landscape, we often come across the term landscape potential.

According to Čech and Drdoš (2009), landscape potential expresses the ability of the landscape to offer people natural resource, or complex or resources for using while at the same time this using influences other resources in given landscape. The term landscape potential is not delimited exclusively to attributes of natural components of the landscape, but includes also socio-economical aspects, i.e. it is based on the geographical notion of landscape.

There are various types of landscape potentials. Mazúr (1980) in Atlas SSR, on the map of functional delimitation of the landscape based on potential, distinguishes these basic landscape potentials: potential for agriculture, potential for forest management, the potential for tourism, the potential for urbanization, the potential for water resource management, and the potential for road building.

Several authors agree that one of the landscape potentials is the potential for recreation i.e. tourism. Izakovičová, Mikloš, Drdoš (1997) understand this potential as the capability of the landscape to provide man with recuperation. Mariot (1983) perceives landscape potential for tourism as a term, which is associated with a particular area and expresses the capability of this landscape to offer conditions for the development of tourism. Apart from the relation with the particular area, the landscape potential relates to the forms of tourism. The overall potential of a particular area is the combination of potentials for particular forms of tourism. The term landscape potential represents the objective ability of landscape in terms of the development of tourism regardless of the implementation of the

interest. Landscape potential can be divided into natural potential and potential made by man (Mariot, 1983).

Regarding this type of potential, it is possible to take into consideration subjective and objective criteria in assessment. Objective criteria stem from the properties of the landscape character and its individual components while subjective criteria are a result of man's perception (e.g. Oťaheľ 1999).

Čech (2006a, 2006b, 2006c) deals with the assessment of partial element of the natural environment (georelief) in relation to tourism. The author addresses spatial differentiation of georelief in terms of attractiveness for tourism in different regional units.

This article deals with the assessment of landscape potential for recreation and tourism, based on the analysis of selected indicators in the area of microregion Minčol in Prešov region in the Slovak republic. This assessment is based on a special methodology of weighting of selected indicators in the area of the geographical grid, and the resultant map is then processed by means of geographic information systems.

PHYSICAL-GEOGRAPHICAL CONDITIONS OF MICROREGION MINČOL

The area of microregion Minčol is situated in the north of Slovakia, in the district Stará Ľubovňa, where it occupies parts of geomorphologic units of Čergov Mts., Ľubovnianska vrchovina Mts. and Spišsko-šarišské medzihorie Mts. The microregion stretches in the area of 125,92 km^2.

Regarding geological structure, it is a relatively diversified area. Southwestern part of the microregion is built-up by Inner-Carpathian paleogene rocks, with dominant litotype – Šambron Member. Northern and eastern part are in the flysch zone of the Magura tectonic unit with Krynica (Čergov) lithofacies unit. The border between them in the central part of the microregion is klippen belt with a complex geological structure represented by paleogene, cretaceous and jurassic rocks (Nemčok et al. 1990).

The highest spot is Minčol, in the cadastre of Kyjov with the altitude 1157 m above sea level and the lowest spot is 460 m above sea level in the cadastre of village Orlov, in the place where river Poprad leaves the territory of the microregion. The vertical interval between these two places is 697 m. With respect to a diversified geological composition, the microregion territory is characterized by a broad scale of geomorphologic forms. Spišsko-šarišské medzihorie is dominated by fluvial forms (river flood-plains, terraces, alluvial cones) supplemented by massive, usually isolated klippen monadnocks. In Ľubovnianska vrchovina and in Čergov, there are remains of middle-mountain planated surface and the prevailing forms are denudational and fault-denudational slopes on flysch and limestones.

In accordance with the climate classification (Lapin et al. 2002), the territory is situated in two climatic regions: mesothermal climate region, zone M5 (mesothermal, humid with cool to cold winter, valley-like/basin-like) – the temperature in January reaches under -3°C, in July it reaches over 16°C, there are less than 50 summer days during a year. Within the microregion the territory spreads along river Poprad. A small part of the area in the southwest, around Hromovec belongs do the zone M6 (mesothermal, humid, uplands-like) – the temperature in July reaches over 16°C. The highest parts of the area extend to cool climate region – zone C1, which is mildly cold with the average temperature 12-16°C in July. This climate region covers a significant part of Ľubovnianská vrchovina Mts. and Čergov Mts.

From the hydrographical point of view, the microregion belongs to the drainage basin of Poprad and Dunajec, which as the only one in Slovakia belongs to the continental divide of the Baltic Sea. River Poprad is the most significant water-course of the microregion. It is of the snow-fed and the rain-fed type of water regime. It reaches the highest stage of water in April and the lowest stage in January. The whole northern ridge of Čergov belongs to the main European watershed. Water courses from eastern slopes of Čergov get into the Black

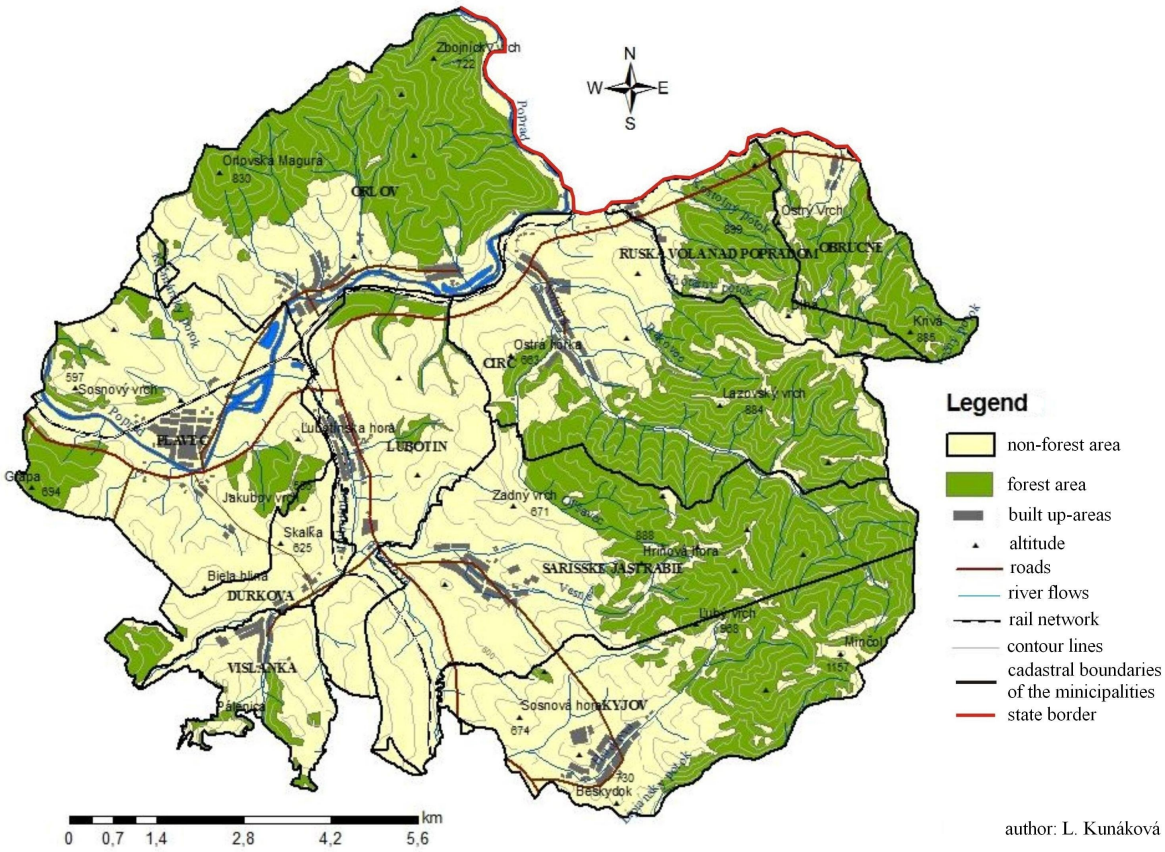
sea through river Topľa and water courses from western slopes get into the Baltic Sea through river Poprad.

Regarding the soil conditions, the microregion is dominated by cambisols (especially Čergov, Ľubovnianská vrchovina), the floodplain of Poprad and other bigger water courses are dominated by fluvisols. In klippen belt there are local occurrences of rendzinas and pararendzinas; and there are litosols on extremely skeletal sections and rankers. Concerning soil types, there are mainly clay soils and sand-clay soils.

Potential natural vegetation of the microregion includes following associations (Michalko et al. 1986): association of riparian intermountain and mountain forests (from alliance *Alnenian glutinoso – incanae, Salicion triandrae p.p., Salicion eleagni),* association of beech forests (especially from alliance *Eu – Fagenion p.p. min. a Eu – Fagenion p.p. maj.),* tilia and maple forests (from alliance *Tilio-Acerenion),* oak, horn-beam and tilia forests (from alliance *Tilio-Carpinnion betuli).*

The whole area of the microregion, and particularly the area of Čergov are significant for natural attributes, which gradually acquire their value. Its peculiarity consists of relative wilderness, low visit rate and vast diversity of fauna and flora. In the 1980s and 1990s, this area was declared a national nature reserve Čergovský Minčol and obtained well-deserved state protection. Other protected territories were created in the area of the microregion, such as Okrúhly kopec, Rebrá, Kyjovské bradielko, Lysá hora, or Slatina next to Šarišské Jastrabie, Plavečská stráň and Plavečské štrkoviská (Osvaldová 1991).

Map 1 **General-geographical map of the microregion Minčol**



METHODOLOGY

The methodology of assessment of landscape potential for recreation and tourism of microregion Minčol is based on older works of Mannsfeld (1983), Mazúr et al. (1985), Oťaheľ, Poláčik (1987); Lehotský (1991) and others, with modification for the conditions of the microregion Minčol. Considering the relative proximity of the terms recreation and tourism and their frequent mutual diffusion in space, we assess stated potential as a whole. Based on natural premises for this activity as well as on material and technical services, or let us say the occurrence of cultural and historical landmarks, it is possible to deduce, even before the actual assessment, a relatively low significance of this potential for the microregion. This fact has been another motive for the unified assessment of recreation and tourism as one potential. We also do not consider summer and winter form of tourism separately. Georelief, climatic conditions, the occurrence of water areas and water courses

and plant cover are generally considered to be the basic natural conditions of the landscape potential for tourism. The smaller significance is attributed to the occurrence of certain animal kinds and geological and soil conditions are the least significant. In the microregion Minčol, the attractiveness and diversification of georelief and plant cover are the most attractive features for recreation and tourism. Considering the relatively small area, there was a minor emphasis on climatic conditions and the occurrence of water areas and water courses. Forms of landscape cover are strongly reflected in types of the present-day landscape; hence, this criterion was used as well. Due to the almost zero existence of cultural and historical landmarks and material and technical facilities, these attributes were excluded from the assessment as well. For the sake of a possible detail of assessment, the basic evaluation grid was created in the environment of GIS (Geographic Information System) with square size 0,5 km^2. Thus considering that the microregion area is 126 km^2, 559 squares were created. This grid was then added as another layer of the respective analytical maps. Within the frame of every square, standardized points were assigned to respective attributes, whose assessment is relevant to the specific type of landscape potential. Determining criteria were chosen for a certain type of potential and signification (value) of individual criteria (classification characteristics) was designated. Determination of the degree of significance of the main classification characteristics and calculation of their standard importance were processed in accordance with the methodology of Říha (1995a, b). Classification characteristics, whose assessment is relevant for the specific type of potential, were arranged according to their significance following Table 1. What followed was the calculation of significance of individual classification characteristics (W_j^n in Table 1), which were multiplied by the value of the individual intervals of each and every classification characteristics (Table 2-8). The value of potential for recreation and tourism (for each and every square with size 0,5 km^2) was then calculated according to the following formula:

$$\mathbf{K} = \sum_{i=1}^{13} K_{1_i} \,.\, W_1^n + \sum_{i=1}^{8} K_{2_i} \,.\, W_2^n + \sum_{i=1}^{3} K_{3_i} \,.\, W_3^n + \sum_{i=1}^{3} K_{4_i} \,.\, W_4^n + \sum_{i=1}^{3} K_{5_i} \,.\, W_5^n + \sum_{i=1}^{3} K_{6_i} \,.\, W_6^n + \sum_{i=1}^{3} K_{7_i} \,.\, W_7^n$$

The resulting value was obtained by adding up the points in each square. This value was classified into the 5-degree scale of the suitability of a certain type of landscape potential (1 – very unfavourable potential, 2- unfavourable potential, 3 – medium-favourable potential, 4 – favourable potential, 5 – very favourable potential).

Tab. 1: Calculation of weighted values for selected localization assumptions for recreation and tourism

r	j	classification sign	k_{r_i}	$k_{r_i}^s$	W_j	$W_j^n = W_j/y$
1	1	k_{1_i} Types of present landscape	1	1,5	7	0,226
2	2	k_{2_i} Sculptural variety and contrast of georelief	1	1,5	7	0,226
3	3	k_{3_i} The occurrence of water courses and water bodies	2	3	5,5	0,177
4	4	k_{4_i} Attractiveness of view	3	4	4	0,129
5	5	k_{5_i} Climate – the number of days with snow cover	4	5,5	3	0,097
6	6	k_{6_i} Climate – the annual amounts of global radiation	4	5,5	3	0,097
7	7	k_{7_i} Morphological-morphometrical types of georelief	5	7	1,5	0,048

Notes: k_{r_i} – simple order of significance, $k_{r_i}^s$- standardized order of sign, W_j- weight of signs, W_j^n- standardized weight of signs, $y = (W_1 + W_2 + W_3 + ... + W_7)$

Tab.2 : Types of present landscape

i	classification sign k_{1_i}	k_{1_i}	$k_{1_i}^s$	K_{1_i}	$K_{1_i} \,.\, W_1^n$
1	type of landscape with mostly non-productive function of forest (protective forests)	1	2,5	12	2,712
2	type of landscape with mostly non-productive function of forest (special designation forests)	1	2,5	12	2,712
3	type of landscape with the occurrence of water courses and water bodies	1	2,5	12	2,712
4	type of landscape with the concentration of cottage function	1	2,5	12	2,712
5	type of landscape with transitional woodland shrub on unused agricultural land	2	6	9,5	2,147
6	type of landscape with the intention to produce beech wood material	2	6	9,5	2,147
7	type of landscape with the intention to produce spruce wood material	2	6	9,5	2,147
8	type of landscape with prevalence of permanent grass areas.	3	8	8	1,808
9	type of landscape with the domination of unused arable land	4	9,5	6	1,356
10	type of landscape with concentrated rural settlements,	4	9,5	6	1,356

	mainly with housing functions located in mountain valleys and uplands				
11	type of landscape with concentrated rural settlements, mainly with housing functions located on river floodplains and terraces.	5	12	2,5	0,565
12	type of landscape with industrial areas and courtyards of agricultural cooperative farms.	5	12	2,5	0,565
13	type of landscape with a predominance of arable land	5	12	2,5	0,565

Notes: k_{1_i} - simple order of significance, $k^s_{1_i}$ - standardized order of sign, K_{1_i} - weight of signs

Tab 3: Sculptural variety and contrast of georelief

i	classification sign k_{2_i}	k_{2_i}	$k^s_{2_i}$	K_{2_i}	$K_{2_i}.W^n_2$
1	little varied, flat sculptures (flood-plains)	4	8	2	0,452
2	little varied, low-lying, regularly undulating sculptures of platforms, ridges and wide flat valleys (river planated surface, river terraces, deep V valleys on river planated surface	3	6,5	4,5	1,017
3	little varied, higher-lying, regularly undulating sculptures of platforms, saddles (middle-mountain planated surface)	3	6,5	4,5	1,017
4	mildly to moderately differentiated, smooth cut, erosion-denudation sculptures (upland slopes, slightly inclined slopes on flysch)	2	4,5	6,5	1,469
5	moderately differentiated, cut, erosion-denudation sculptures (steeper slopes on flysch, facetas, moderate slopes on limestones)	2	4,5	6,5	1,469
6	contrast, erosion-denudational sculptures with local occurrence of rocky forms	1	2	8	1,808
7	contrast, erosion-denudational sculptures with middle occurrence of rocky forms	1	2	8	1,808
8	contrast, erosion-denudational sculptures with strong occurrence of rocky forms	1	2	8	1,808

Tab. 4: The occurrence of water courses and water bodies

i	classification sign k_{3_i}	k_{3_i}	$k^s_{3_i}$	K_{3_i}	$K_{3_i}.W^n_3$
1	areas with the occurrence of surface water courses without breeding and hunting districts	3	3	1	0,177
2	areas with the occurrence of surface water courses with breeding and hunting districts areas with water bodies with the occurrence of hunting districts, unsuitable for swimming and water sports	2	2	2	0,354
3	Areas with water bodies with the occurrence of hunting districts, suitable for swimming and water sports	1	1	3	0,531

Tab. 5: Attractiveness of view

i	classification sign k_{4_i}	k_{4_i}	$k^s_{4_i}$	K_{4_i}	$K_{4_i}.W^n_4$
1	low	3	3	1	0,129
2	medium	2	2	2	0,258
3	high	1	1	3	0,387

Tab. 6: Climate – the number of days with snow cover

i	classification sign k_{5_i}	k_{5_i}	$k^s_{5_i}$	K_{5_i}	$K_{5_i}.W^n_5$
1	120-140 days	1	1	3	0,291
2	100-120	2	2	2	0,194
3	80-100	3	3	1	0,097

Tab.7: Climate – the annual amounts of global radiation

i	classification sign k_{6_i}	k_{6_i}	$k^s_{6_i}$	K_{6_i}	$K_{6_i}.W^n_6$
1	1100-1150 kWh.m^{-2}	1	1	3	0,291
2	1050-1100 kWh.m^{-2}	2	2	2	0,194
3	1000-1050 kWh.m^{-2}	3	3	1	0,097

Tab. 8: Morphological-morphometrical types of georelief

i	classification sign k_{7_i}	k_{7_i}	$k^s_{7_i}$	K_{7_i}	$K_{7_i}.W^n_7$
1	highlands	1	1	4	0,192
2	uplands	2	2	3	0,144
3	hill lands	3	3	2	0,096
4	plains	4	4	1	0,048

Figure 1: View from the Kamenický hrad castle to the highest point of the microregion-Minčol hill (1157 m above sea level) with a very favourable potential for recreation and tourism

Figure 2: Andrejovský pond in the cadastral area of Orlov with a very favorable potential for recreation and tourism. In the background the northern part Čergov Mts.

Figure 3: View of Spišsko-šarišské medzihorie georelief in the cadastral territory of Ďurková with a predominance of arable land and permanent grass land. Unfavourable potential for recreation and tourism

Figure 4: Rebrá-klippen monadnocks of Klippen belt, contrasting element in a predominantly agricultural landscape of Spišsko-šarišské medzihorie. The favourable potential for recreation and tourism.

RESULTS

The resulting summary value in each and every square pertains to the particular degree of suitability of the landscape potential for recreation and tourism (map 1). Potential was divided into five levels (intervals):

1. Very unfavourable potential – this type of potential falls within the territory absolutely unsuitable for the stated activity. It is an agricultural land of Spišsko-šarišské medzihorie, with the dominant type of agricultural land, with the prevalence of arable land and partially with the type of agricultural land with the concentration of country houses. In terms of sculptural variety of the georelief, there are not very diverse, flat sculptures of river flood-plains, terraces and river planated surface. Drainage density in this type is low. The attractiveness of view is average, due to the flat surface and predominant absence of barriers. The number of days with snow cover per one year is 80-100 days and there are 1050-1100 kWh.m^{-2} of sunshine.

From the point of view of morphometrical and morphological types of relief, there are dominant plains and uplands.

2. Unfavourable potential – this type of potential is space-differentiated in Spišsko-šarišské medzihorie. Regarding the types of present-day landscape, agricultural land, with the prevalence of arable land and permanent grass areas (meadows, pastures) are dominant. Concerning the georelief there are mainly river terraces and slightly inclined slopes on flysch and limestones. Draining density is higher than in the previous type, also with the occurrence of surface water courses with breeding and hunting districts. The attractiveness of view is average. The number of days is 80-100 days per year and there are 1000-1150 $kWh.m^{-2}$ of sunshine. There are mainly uplands.
3. Medium-favourable potential – occupies continual areas in the central part of the intermountain, as well as on its contact with surrounding mountain units. The dominant landscape is with the production of beech wood materials and the type of agricultural landscape with the prevalence of permanent grass areas. Georelief in this type is relatively various, there are several forms, the most wide-spread are planated surfaces. There are prevalent surface water courses without breeding and hunting districts. The attractiveness of view is mostly average. Sunshine reaches 1050-1100 $kWh.m^{-2}$ and snow cover lasts 80-100 days in a year. There are mostly uplands, followed by highlands.
4. Favourable potential – this type of potential is the most widespread and the most homogenous in the microregion. It covers mostly parts of mountain range Čergov, Ľubovnianská vrchovina and Hromovec, as well as klippen monadnocks in Spišsko-šarišské medzihorie. Regarding the type of the present-day landscape, there is landscape with beech and spruce wood materials and marginally also the agricultural type of land with unused arable land. When considering the sculptural variety of

georelief, there are mainly erosion-denudational slopes on flysch and contrast erosion-denudational sculptures with the predominance of rock forms. This type of potential includes surface water courses without breeding and hunting districts. The attractiveness of view is low in the mountain region, due to the barrier effect of forest stand, but high in klippen monadnocks area, uncovered by forest vegetation. Sunshine is low, with 1000-1050 kWh.m^{-2} and snow cover lasts 100-120 days a year. There are different types of georelief, from uplands to highlands.

5. Very favourable potential – this type of potential offers the most favourable conditions for recreation and tourism. These are the most visited territories, which can be divided into two kinds: a) ridges and meadows of Čergov (in the vicinity of Minčol, Malý Minčol, Hriňová hill) and b) territories with surface water courses with declared breeding and hunting districts (Hradlová, Olšavec, Krčmársky potok stream) and bodies of water suitable for swimming (Andrejovský pond – picture 2). In the intermountain section, it is a type of landscape with the occurrence of water courses and bodies of water and in the mountain section, it is a type of landscape with an orientation to the production of beech and spruce wood materials and a type of landscape with the mostly non-productive function of forest (protective and special designation). Concerning the forms of georelief, there are river flood-plains, middle-mountain planated surface and erosion-denudational slopes on flysch. There are many surface water courses with declared breeding and hunting districts and bodies of water suitable for swimming. The attractiveness of view is medium to high. Snow cover lasts the most, as many as 120-140 days a year and sunshine reaches 1000-1100 kWh.m^{-2}. There are plains and highlands.

DISCUSSION AND CONCLUSION

All components of physical and geographical sphere have a significant influence on the regional development of regions, whether that development is positive or negative. It is inevitable to joint all potentials and regard preservation of the uniqueness and originality of particular territory. One of the most urgent problems is the re-evaluation of functions of landscape potentials for tourism and adjustment of this function to the proper delimitation of agricultural and forest fund, as well as to the residence function. Nature protection also demands substantial attention. Measuring landscape potential also means a shift to the sphere of landscape planning. Landscape assessment in the sense of suitability and reserve of the future rational landscape exploitation present one of the introductory stages of the geographical prognosis.

Landscape potential for recreation and tourism, while regarding the type of present-day landscape also considers variability and contrast of georelief, occurrence of bodies of water, the view attractiveness and the existent network of marked tourist routes. Based on these factors, this type of potential is concentrated in the Čergov area, where it follows individually marked climbing routes for the main ridges. Morphologically massive klippen monadnocks belong in the area of klippen zone. These klippen monadnocks offer a high attractiveness of views; this is also the area to the south of the built-up area of Plaveč, which is attractive due to the castle remains of Plaveč with the wide view of the vicinity. This area is connected with the recreational settlement Pastovník, with its individual cottage built-up area. In the Ľubovnianská vrchovina there belongs also marked climbing the route to Orlovská Magura, which is a good viewing point. The last locality with this type of potential is in Andrejovka (a local area of Orlov), where tourism and recreation are concentrated into the area of Andrejovské ponds.

The present-day area of forests with the primary production function and the intensity of their exploitation are excessive. As a consequence, we propose the development of the

alternative off-productive ways to use forest areas. Considering the relatively well-preserved part of natural areas (local forest stands with natural wood structure in extreme positions, the occurrence of endangered and rare fauna and flora, the needs for erosion control function of forests) as well as the supported efforts to develop tourism in the microregion, we propose increased exploitation of the potential for nature protection, tourism and recreation. It concerns especially valleys in the Čergov mountains with the climbing routes for the main ridges, the very main ridge, which is relatively secluded from the surrounding forest roads. In these places, we propose to use specially the potential for tourism and recreation. In the area of Ľubovnianská vrchovina we propose to develop a potential for tourism and recreation in the area of Orlovská Magura, which presents a good orientation and a view point, at the interest of forest management. We also propose to broaden the functions of the forest of special designation in the frame of the potential for natural preservation to the east of Zbojnícky hill, especially for the purpose of preventing the erosion on its steep east slopes, which descent to the river Poprad.

We suggest the potential for recreation and tourism is expanded in the area of Spišsko-šarišské medzihorie at interest of the present-day agricultural landscape (meadows and pastures and plough land, which is not used), more specifically in two sites in the vicinity of ponds in Andrejovka and in the vicinity of settlement Pastovník, where there are suitable natural ranges for building recreational and sports facilities.

Helpful to the development of recreation and tourism may also be the potential project "In the Tracks of Vanished Villages of Plaveč county". Its objective is to create an educational trail through the remains of Plaveč castle and through the villages, which were in the past in this area, but there are only ruins now. These are perished villages of Leština and Závada, in the cadastre of the village Hromoš and Ďurková. Leština and Závada were small villages, which belonged to the Plaveč county, which perished in the

course of 19th century. Geodetic and topographic surveys and geophysical observations confirmed the existence of monuments of stone buildings in the area of the perished village Leština. In Závada, there are only relicts in the form of man-made terraces (Nemergut, Vojteček 2013).

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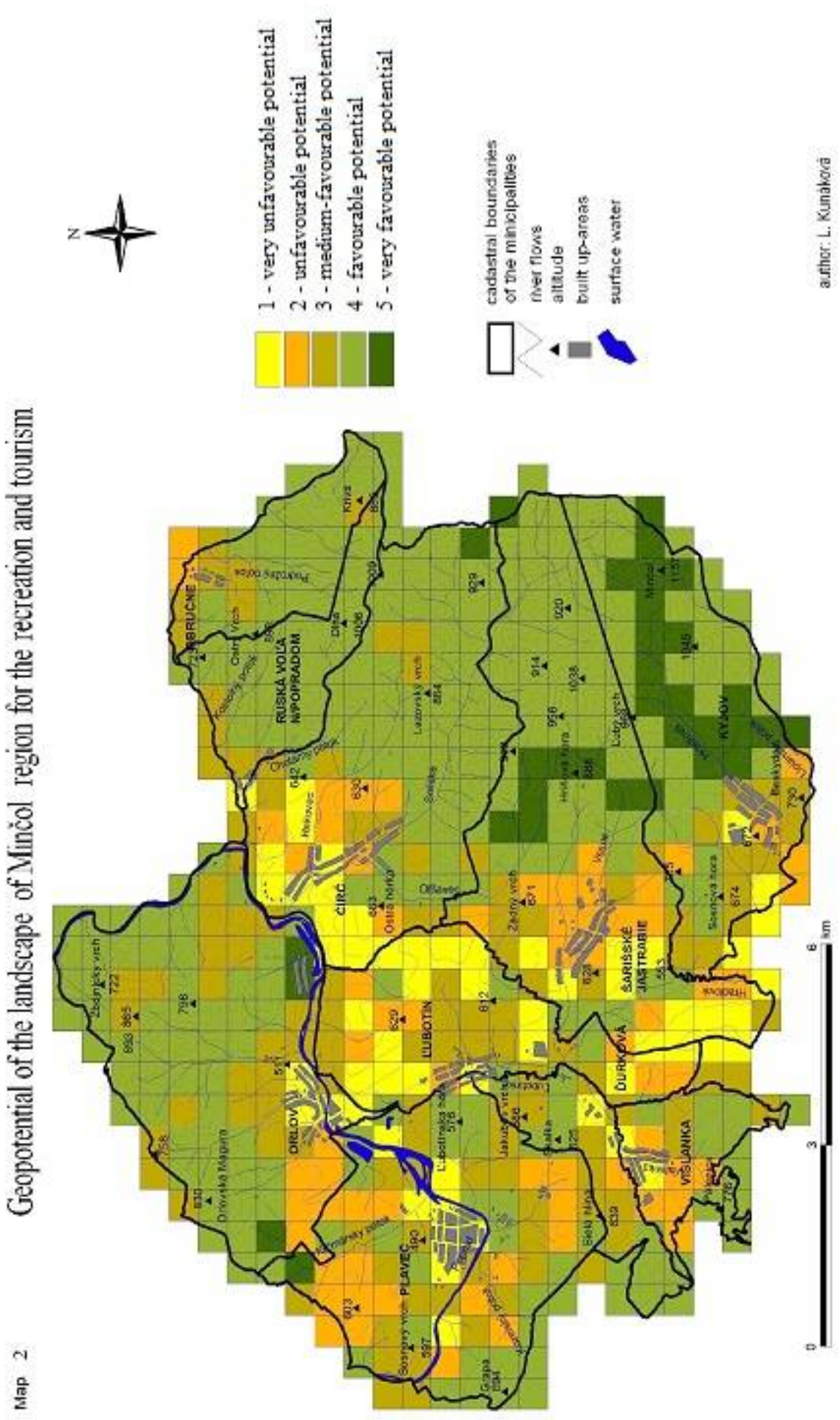
Map 2
Geopotential of the landscape of Mincol region for the recreation and tourism
1 - very unfavourable potential
2 - unfavourable potential
3 - medium-favourable potential
4 - favourable potential
5 - very favourable potential
cadastral boundaries of the municipalities
river flows
altitude
built up-areas
surface water
author: L. Kunáková
N
RUSKÁ VOĽA NAD POPRADOM
ABRUĆNE
ORLOV
ĽUBOTÍN
ŠARIŠSKÉ JASTRABIE
DURKOVÁ
VISŤ ANICA
PLAVEC
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