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DOI: 10.2478/jlecol-2023-0003 Journal of Landscape Ecology (2023), Vol: 16 / No. 1

SUSTAINABLE TOURISM PLANNING ON LANDSCAPE SCALE: CASE STUDY FROM SLOVAKIA (CENTRAL EUROPE)

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Received: 17th April 2023, **Accepted:** 11th May 2023

ABSTRACT

The European cultural landscape and its traditional values represent a significant condition for recreation and tourism. However, we are aware of the negative consequences of human activity in the past years in rural areas and pay more attention to protecting these values. Modern rural recreation and tourism must be built on scientific background. That is why the presented contribution brings an innovative integrated approach to sustainable rural recreation and tourism model by applying landscape ecological planning methodology with a combination of ecological stability and landscape character assessment. It deals with the qualitative evaluation of the landscape potential of the foothill village of Podkonice in Slovakia and the possibilities of its use in sustainable rural tourism. Determining the potential in confrontation with different forms of tourism activities can help achieve a sustainable tourism concept. The main result of the presented research is the final optimal selection of activities and use of the landscape with regard to the development of tourism. Such a proposal can be used in spatial planning and strategic decision-making processes not only in the study area, but it can be applied in the European context.

Keywords: sustainable recreation and tourism, European cultural landscape, integrated approach, landscape ecological planning, landscape ecological stability, visual character assessment, Podkonice village, Slovakia

INTRODUCTION

The European cultural landscape represents a significant potential for natural, cultural, but also historical or traditional values, which we find mainly in the harmony of buildings with the surrounding nature and landscape or the symbiosis of natural and man-made works (Gullino *et al.*, 2015; Devecchi, 2019). Preserved biodiversity in the countryside, the quality of individual components of the environment, agricultural and forestry systems with high natural value, or the preserved and improved quality of underground and surface water together with a balanced landscape structure are the best prerequisites for relaxation and tourism in the countryside (Flekalová, 2015).

Slovakia is a country where primary agricultural production was dominant. However, in recent years, the Slovak countryside has lost its primary economic function provided by agriculture. The huge potential of the countryside must be used as a possible alternative to agricultural activities (Špulerová *et al*., 2017). This alternative is represented by rural tourism, through which it is possible to ensure a new influx of job opportunities in the countryside and restore the economic function of the countryside.

Rural tourism represents a relatively new form of tourism in Slovakia. It is the realization of tourism in a rural area, outside of recreational activities (Špulerová & Hrnčiarová, 2008), which is linked to the environment of a rural settlement different from civilized recreational activities (Babinský, 2012). Its peculiarity lies in the decentralization of accommodation facilities, which makes it possible to disperse the number of tourists and thus eliminate the negative effects brought about by a high concentration of people in tourist centers. It allows individual activities when offering a product and its implementation (Gondová *et. al*., 2000; Habán & Otepka, 2004).

Large tourism centers no longer sufficiently satisfy the needs of modern tourist, who is much more environmentally conscious than in the past (Bai, 2017). Currently, tourists are looking for an escape from the stress of modern life in the city (Luvvas & Stoll, 2019). The countryside can provide them with peace, and quiet, a return to nature and traditions, and activities linked to nature and beneficial for their health. The main principle of rural tourism is to provide basic and additional services with an emphasis on the preservation and non-violation of nature and natural resources. A person must learn to coexist with nature and use its potential so that the limits that negatively impact the country's natural components are not exceeded (Angelstam *et al*., 2021). And that is exactly what rural tourism leads us to.

Currently, however, we are aware of the negative consequences of human activity in the past years in the rural area and we pay more and more attention to the protection of landscape values in their landscape-ecological, cultural-historical, and also the psychological-social position (Sunlu, 2003; Rossler, 2019). Rural areas still struggle with problems related to population outflow, lack of amenities and social services, or pressure from ongoing changes in agriculture.

Modern tourism today is built on scientific principles; is based on empirical knowledge of the country to achieve a sustainable model of tourism. On the one hand, they accurately evaluate the positive effects and benefits of tourism on the human organism, on the other hand, a wide range of equivalents of the natural environment as well as artifacts of the cultural background of the recreational area or targeted destination (Kowalska, 2019, Mederly *et al*., 2017).

The development of rural tourism can, with the appropriate approach, contribute to the development of the village while preserving its character and cultural-historical values by the protection of ecologically significant segments of the country (Bell *et al*., 2009; Lourenco Gomez *et al*., 2015) But it requires a complex process of harmonizing the country's natural, socio-economic, and cultural-historical potential with relevant spatial requirements and accompanying measures for the restoration of the natural features of the country.

Landscape ecology provides a very effective framework for science-based tools that may provide a sustainable tourism model in European cultural landscapes, by enforcing optimal land uses (Izakovičová *et al*., 2019; La Rosa & Izakovičová, 2021). In this context, we can use the combination of various forms and concepts of landscape ecology research to meet our goals (Miklós & Špinerová, 2018).

The main target of our research presented in the paper was to develop a sustainable rural tourism model that can be directly utilized in both spatial planning and decision-making processes at local level. In this context, the article presents an integrated approach to

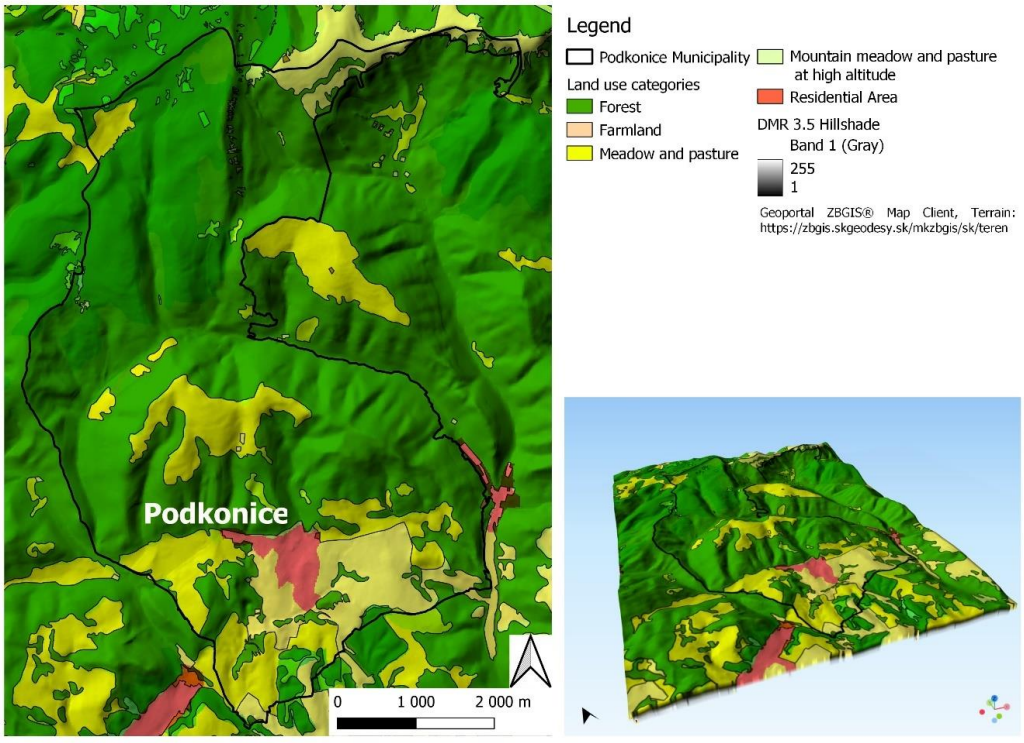
sustainable tourism planning based on the principles of landscape ecological planning, landscape ecological stability, and visual landscape assessment of the territory of the foothill village of Podkonice in Slovakia. The basis of an integrated approach to the utilization of the territory is decision-making based on comprehensive information about the territory and seeking the greatest possible harmony between preserving valuable elements of the landscape and developing economic activities.

MATERIALS AND METHODS

Study area

The study area is the village of Podkonice, representing a typical foothill village at the foot of the southern slopes of the Low Tatras, in the Banská Bystrica basin, below Vysoká hill (987.6 m above sea level). The center of the village is located at an altitude of 529 m above sea level. m., cadastral territory 500 to 1330 m above sea level. m. The northern part of the cadastral territory is formed by the forests of the Horehron Mountains. The southern part of the cadastre is made up of agricultural land (meadows, pastures, and arable land, Fig. 1). The village of Podkonice is located 15 km northeast of the regional town of Banská Bystrica (PHSR Podkonice, 2021)

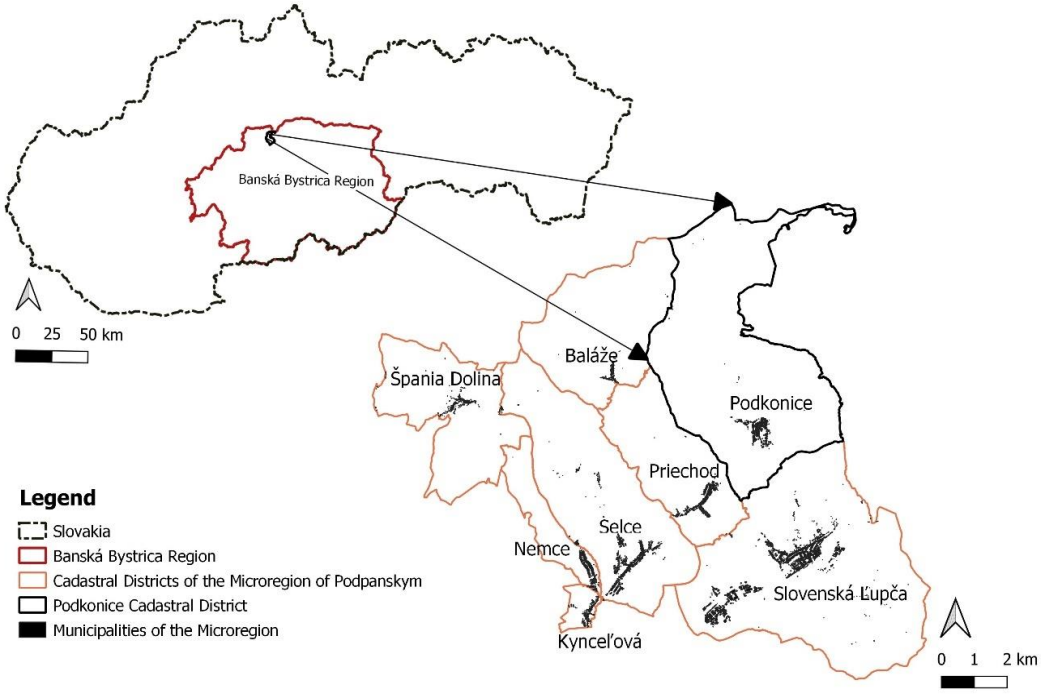
Fig. 1: CLC model of the study area



In the settlement structure, the village of Podkonice is a small rural settlement with a population of 877, which is economically tied to the regional town of Banská Bystrica. It is

part of the central Slovak mountain region of folk culture and an association of eight municipalities (Baláže, Kynceľová, Nemce, Podkonice, Priechod, Selce, Slovenská Ľupča and Špania Dolina), which together form the microregion called „Pod Panským dielom“, which was established in March 2000 (Fig. 2). The common goal of the microregion's municipalities is partnership and cooperation in the field of tourism, solving issues of employment, and civic amenities, solving environmental problems and preserving folk and local traditions (ÚPN Podkonice, 2021).

Fig. 2: The study area (the location of the Pod Panským dielom microregion within the territory of Slovakia and the location of the Podkonice village in relation to the micro-region Pod Panským dielom)



This area is characterized by the concept of territorial development of Slovakia as an area of the ecological and cultural value of pan-European importance, with the assumption of dynamic development of tertiary and quaternary activities with development priorities in the field of tourism and recreation (KURS, 2011). The urban structure of the Banská Bystrica city and its satellite rural municipalities in symbiosis with the landscape and natural environment, which is part of the protected areas of nature, is an area with high functional and spatial availability.

The intensive ties of the city with almost all the municipalities of the district result from the historical development of the residential structure of the area and the mutually complementary transport and functional relations. The possibilities for developing the

village of Podkonice will be based on mutual relations between the city of Banská Bystrica and the surrounding countryside, which has a natural potential for developing tourism activities.

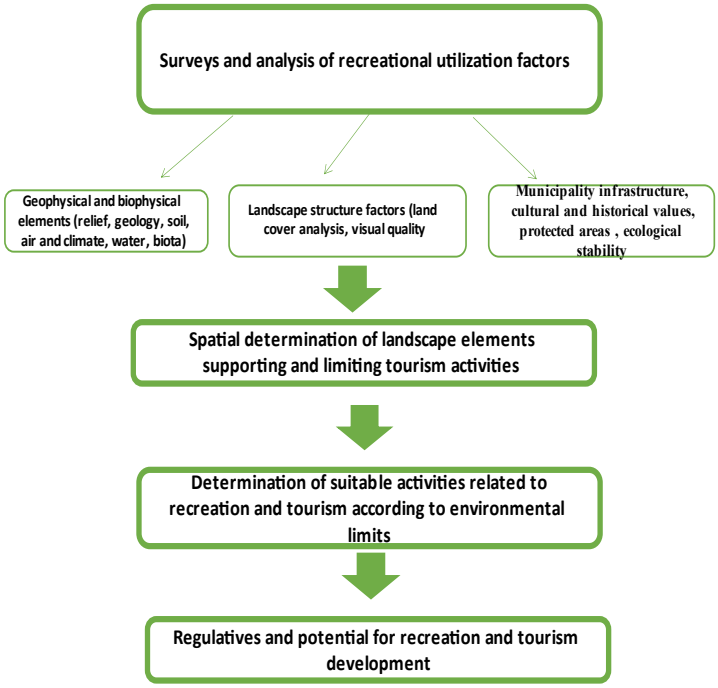
Methods

The employed research methodology follows the principles of landscape ecology and uses the steps of landscape ecological planning (LANDEP) and planning of territorial systems of ecological stability (TSES) the latter of which is commonly carried out in Slovakia and the Czech Republic. Both concepts share the common steps of analysis of abiotic, biotic, and socio-economic factors, synthesis, evaluation, and propositions. In general, LANDEP is based on prescribing and suggesting the optimal spatial configurations of landscape with the proposal of the most appropriate distribution of social activities (Ružička & Miklós, 1982) and TSES is a special ecological network aiming at the connect the individual landscape segments in order to maintain or increase the ecological stability of a given territory. (Buček *et al*., 1986; Miklós, 1986).

We have identified those procedures of the abovementioned concepts and capabilities of landscape that can facilitate the qualitative evaluation of the study area landscape potential for sustainable rural tourism and recreation activities. In addition, both concepts are science-based tools providing sustainability in the European cultural landscape.

Following this methodology the research was conducted by the individual methodological steps presented in Figure 3.

Fig. 3: A methodological approach



The analytical step consisted of describing and characterizing geophysical, biophysical, landscape, and socioeconomic factors of landscape utilization. Both landscape structure and visual quality analysis were key factors for next methodological steps.

The purpose of the synthesis part is the processing of the synthesis of phenomena and elements supporting tourism-related activities and the synthesis of phenomena and elements limiting the development of tourism-related activities. On the basis of the methodology (Míchal, 1992 in Ivan *et al*., 2014), we also located parts of the landscape with eco stabilization function within the addressed territory.

Landscape ecological assessment (evaluation) is the process of determining the suitability of the landscape for the location of selected social activities and subsequent optimization measures (Miklós & Špinerová, 2018). The evaluation is the core of the entire methodological procedure, in which the proposed human economic activities related to rural recreation and tourism development are confronted to landscape-ecological conditions with actual activities in the country using limits. The evaluation process was based on outputs from the previous step, social requirements (proposed activities and use) according to social requirements for the study area (e.g. recreational activities, urbanization activities, agriculture, forestry, water management, preservation of the current landscape structure, housing and transport with a more detailed breakdown), and determination of the suitability of human activities according to environmental limits (consists in assigning degrees of the suitability of land use according to characteristics).

The limit is the highest possible permissible value at which significant adverse changes in the country are not observed. Limits express a set of acceptably suitable conditions and phenomena that form satisfactory prerequisites for the proposed activities and human life in the country without significant disruption, or threats to components, links and processes in the country. We express this range of degrees of suitability for the proposed activities using the limits of the current landscape structure, the limits of ecological and cultural priorities, and the limits of the current human load on the landscape.

The characteristics of abiotic, biotic, socioeconomic and cultural-historical components of the environment entered into the decision-making process, expressed in the form of grouping into two synthetic maps: synthesis of elements supporting activities related to the development of tourism, and synthesis of elements limiting activities related to the development of tourism. The map of current land cover/land use has a special position, which, on the one hand, acts as a basis for limiting, but also supporting factors, on the other hand, it is the object of an evaluation of the landscape-ecologically optimal use of the territory. From the point of view of landscape-ecological optimization of activities in the country, it is necessary to select from the entire set of properties those indicators that act as the main determinants of the localization of the relevant activities in the territory and to determine the hierarchization (weight) of individual factors within the decision-making process. We consider them to be the basic principles of decision-making.

Similarly, we consider the basic principles of decision-making to be the properties of the secondary landscape structure and the limits resulting from the properties of the socioeconomic structure of the territory, based on legislative restrictions on the development of socioeconomic activities in the territory or on the current burden of individual components of the environment as a result of the action of stress factors.

The choice of proposed recreational activities is based on the characteristics of the village, its natural, cultural and historical features, as well as the specifics of human potential.

The process of selecting activities (socio-economic activities) consists of the following steps, including only proposed and limited activities:

- determination of proposed/limited activities according to factors supporting the development of activities related to tourism - their goal is the selection of interesting and attractive elements of the landscape and at the same time the protection and preservation of diversity individual life forms, landscape-ecologically significant segments and representative ecosystems of the area of interest (protected areas, ecologically significant biotopes, monument zones and objects),
- determination of proposed/restricted activities according to factors limiting the development of activities related to tourism (anthropogenic and natural negative phenomena) - their goal is the identification and determination of the degree of impact on the components of the environment,
- determination of proposed/restricted activities according to the synthesis of the indicated indicators. Limits and restrictions do not act in isolation in the country, but synergistically.

All maps and models were processed in Quantum Geographic Information System (GIS) (QGIS) and interpreted in the national coordinate reference system using code 5514. Public online maps were accessed by a QGIS client of the web map services (WMS) and they are available at the public ZBGIS Geoportal websites operated by the Geodesy Cartography and Cadastre Authority of the Slovak Republic (under the Act no. 215/1995 Coll. on geodesy and cartography, section 2, § 14). ZBGIS is the geometric basis of the national infrastructure for geospatial information (Geoportal ZBGIS® a) and we used it as a background map in 3D models (Geoportal ZBGIS, 2023). Raster georeferenced images of historical maps were accessed through the GeoServer WMS. The current GeoServer instance is running version 2.19.3 and belongs to the Ministry of the Environment of the Slovak Republic. We used a historical ortho mosaic dated to 1950 was used to demonstrate the changes in land cover/land use of Podkonice village. The historical ortho mosaic was created within the project of the Center of Excellence for the Decision Support in Forest and Landscape, Technical University in Zvolen, and the project is available at http://mapy.tuzvo.sk. Historical ortho-mosaic is a product of the ©GEODIS SLOVAKIA, ltd. and historical aerial imagery is a product of ©Topographic Institute Banská Bystrica, and ortho mosaic dated to 2017 is a product of the ©EUROSENSE, ltd. and GEODIS SLOVAKIA, ltd. (Geoserver, 2023;). Terrain hillshade was derived from a high-resolution digital model of relief (DMR) – DMR 5.0. created from LiDAR products of the ZBGIS map portal (Geoportal ZBGIS® b, c) (Geoportal Map Client, 2023; Geoportal Aerial Laser Scanning, 2023)

RESULTS

Surveys and analysis of landscape structure

Due to the geographical character of the region and the settlement, forestry, agriculture, cattle breeding, mountain farming, and pastoral tradition play an important role in landscape-creating activities. In this area, grazing areas were permanently grassy areas. Of the grassy areas, primarily pastures and, to a lesser extent, meadows were used for grazing farm animals.

By comparing map data from aerial mapping (1950) and the current orthophoto map, changes in the afforestation of the landscape and the structure of agricultural land were mainly observed. In the past, the plots were divided into small plots and formed a characteristic mosaic with a specific linear, sometimes fan-like arrangement. Based on this comparison, it can be concluded that deforestation did not take place in this part at all, which is visible in the comparison of the Pleše ski resort in particular. Over time, this area became

afforested due to natural succession, which partially reduced the deforested area, which today belongs to the risk areas threatened by water erosion.

It is known from historical sources that in the past the agricultural land was considerably divided, which was related to the way of management. From the comparison of the historical and current orthophoto map, it is clear that the territory around the village of Podkonice underwent collectivization in the 1950s. It is clearly visible the decrease of small fields that did not exceed the width of 10 meters and in some places their merging into large block fields. Historical landscape structures are preserved mainly in the form of woody vegetation, and we also encounter small landholdings, the structure of which corresponds to the state of 1950 (Fig. 4).

Fig. 4: Landscape structure changes

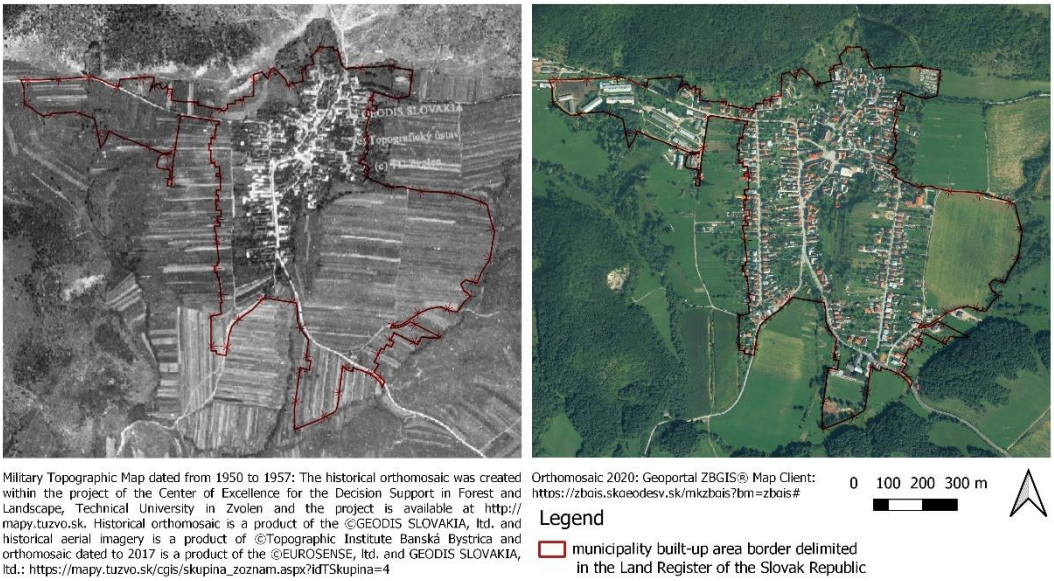


Table 1: Analysis of the land cover/land use

Land cover/land use elements	Area (ha)	Share (%)
Built areas	38,2 ha	1,34
Water bodies	0,5ha	0,016
Arable land	140,1 ha	4,92
Gardens	14, 5ha	0,0508
Hay meadows, grass stands, pastures	891,ha	31,29
Forests	1718,6ha	60,35
Other areas	44, 7ha	2,0332
Total	**2 847,5ha**	**100**

Source: PHSR Podkonice, 2021

Table 2: Landscape character features of the study area

Landscape character features	Identified feature and value	Classification of identified features			
		According to the appearance	According to thhe importance	According to the frequency of the occurence	According to the value
Natural characteristcs features	Hron river floodplain	positive	complementary	relatively rare	prominent
	NDV	positive	co-determining	common	prominent
	forest	positive	principal	relatively rare	prominent
Cultural characteristics features	Land use – arable land, macrostructures	neutral	co-determing	common	common
	Land use – grassland, macrostructures	neutral	co-determing	common	prominent
	Land use – small fields, microstructures	positive	principal	relatively rare	unique
	Land -settlement	positive	Co-determining	common	Common
	Agricultural historical landscape structure	neutral	principal	common	unique
Perception characteristics feeatures	Open landscape scene	positive	principal	common	common
	Attractive view	positive	complementary	common	common
	View horizon	positive	Co-determining	common	prominent
	Visually exposed space of historical landscape structures	neutral	principal	extraordinary	unique
	Natural visual landmarks	positive	principal	relatively rare	prominent
	Cultural visual landmarks	positive	principal	unique	prominent
	External manifestation of the settlenent	positive	co-determing	common	prominent

Source: authors

The largest part of the territory of the cadastre of the municipality of Podkonice consists of forests and non-forest tree vegetation in its middle and highest positions. In the lower positions, there is agricultural land, which is connected to the surroundings of the settlement (Tab. 1). The fields are mostly large-block in nature, but a few original narrow fields have also been preserved. On the slopes in higher positions, there are meadows, pastures, draws, and borders with the forest massif. Non-forest woody vegetation occurs in the form of continuous, scattered, or linear non-forest woody vegetation (NDV).

The aesthetic properties of the village's landscape and its perception were assessed on the basis of the evaluation of the character of the landscape scene from important places with

typical views, defining the view horizons and view dominants. Using the digital terrain of the relief and field surveys, analyses of visual exposure were carried out by us. The open landscape of the Podkonice village is characterized by an undulating foothill to mountain relief with a great range of visibility and clarity of the space. From the point of view of the landscape composition, the surrounding greenery of roads and country roads is important. In addition to the compositional function, the accompanying linear green areas have a compositional function (they mark the entrances to the village and focus visual perceptions on the seat itself). When designing development tourism plans, it is necessary to respect the existing natural scenery to the maximum extent - to preserve areas of forests and permanent grasslands, to preserve the existing area and length of borders, draws, windbreaks, solitary trees, and other types of non-forest green in agricultural land, or complement the character of the agricultural landscape with linear greenery. With such an open landscape scene, it is extremely important to take care of the protection of visual horizons and visual dominants (both cultural and natural). Based on analyzes of the landscape structure and perceptual characteristics of the landscape of the area under consideration, an assessment of the characteristic appearance of the landscape was processed (Tab. 2).

Spatial determination of landscape elements supporting and limiting tourism activities

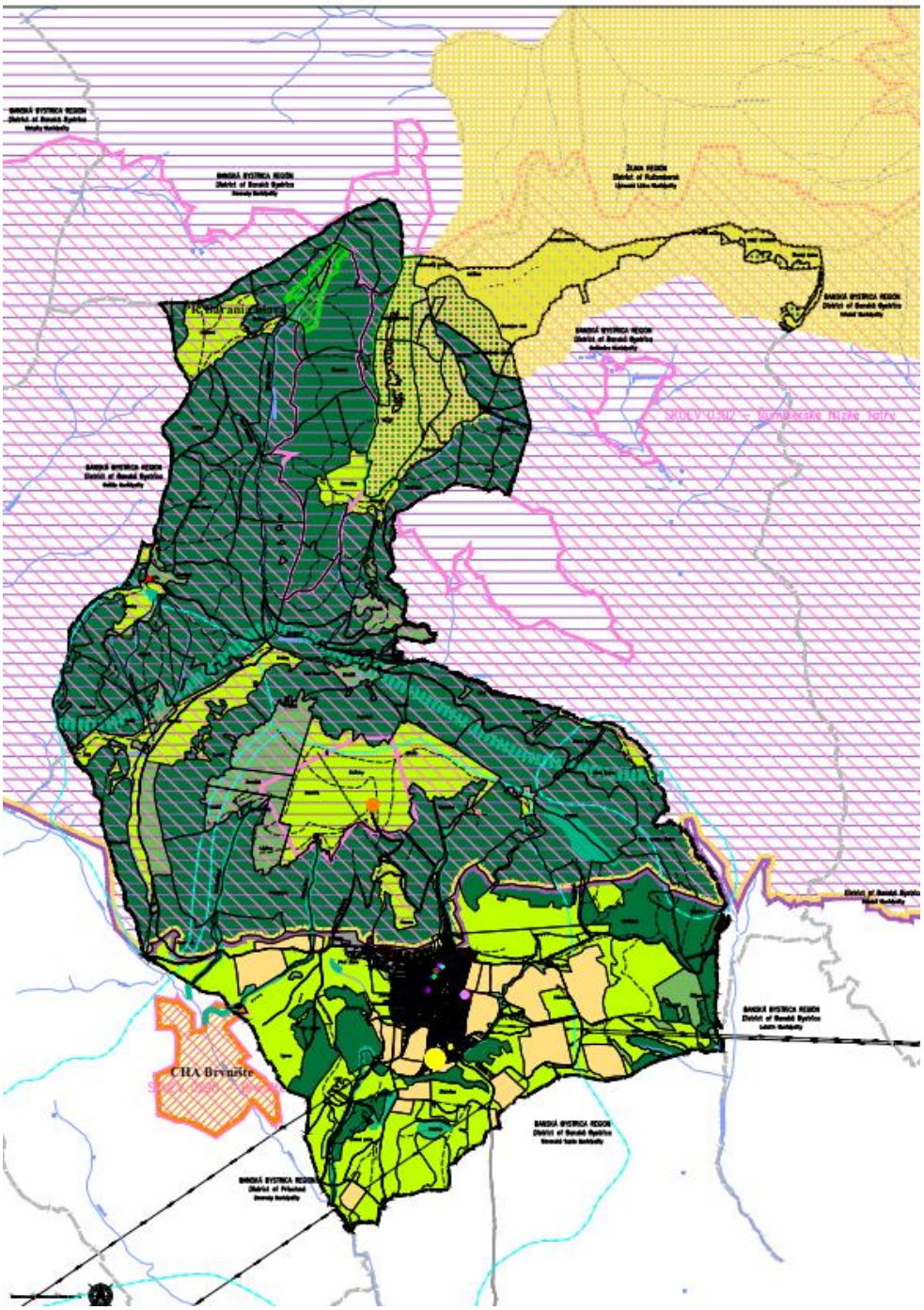
Synthesis of elements supporting activities related to tourism.

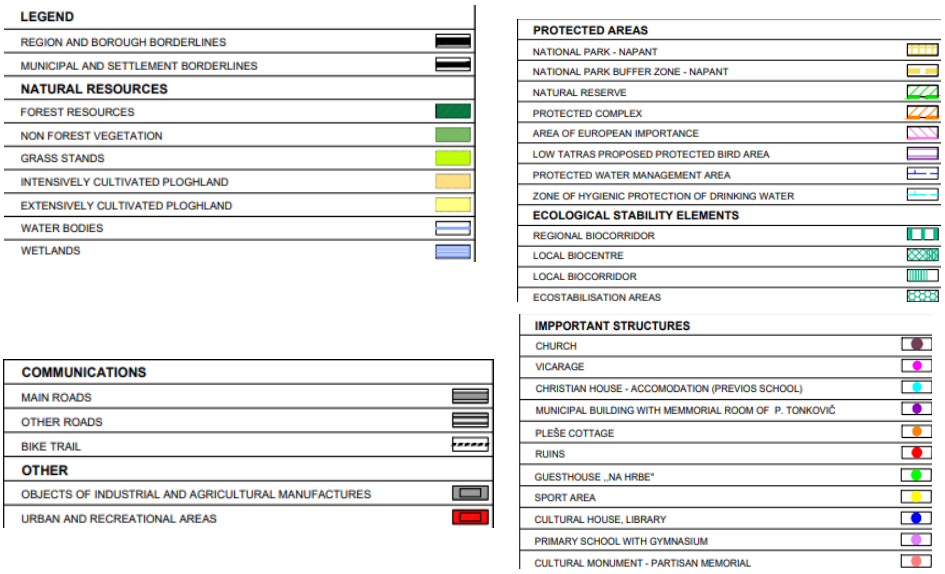
Within this group of synthesis, we processed landscape elements resulting from the biodiversity of the country and ecologically significant segments, from natural and cultural-historical resources, aesthetic values, further elements resulting from the demographic issues of the territory, material and technical infrastructure and other selected socioeconomic elements that support the development of tourism (Fig. 5). The basic inputs for the syntheses of supporting elements were the indicators such as protected areas, elements of the territorial system of ecological stability, heritage areas and natural resources, objects intended for accomodation, work, cultural-religious events, time availability by means of transport (train, bus and car) to the village and to the nearest larger city, accommodation and catering options, but also space for cultural, social and work events.

Synthesis of elements limiting activities related to tourism.

It represents a synthesis of elements limiting the development of activities resulting from natural risks and hazards, environmental hygiene, and existing elements in the country. On a unified cartographic basis, the type of influence of negative factors in the territory is expressed as a synthesis of anthropogenic stress factors (surface water pollution, soil contamination, environmental noise pollution, protective zones of technical elements) and a synthesis of natural stress factors (radon risk, seismic phenomena, wind erosion, water erosion, potential groundwater pollution) (Fig. 6).

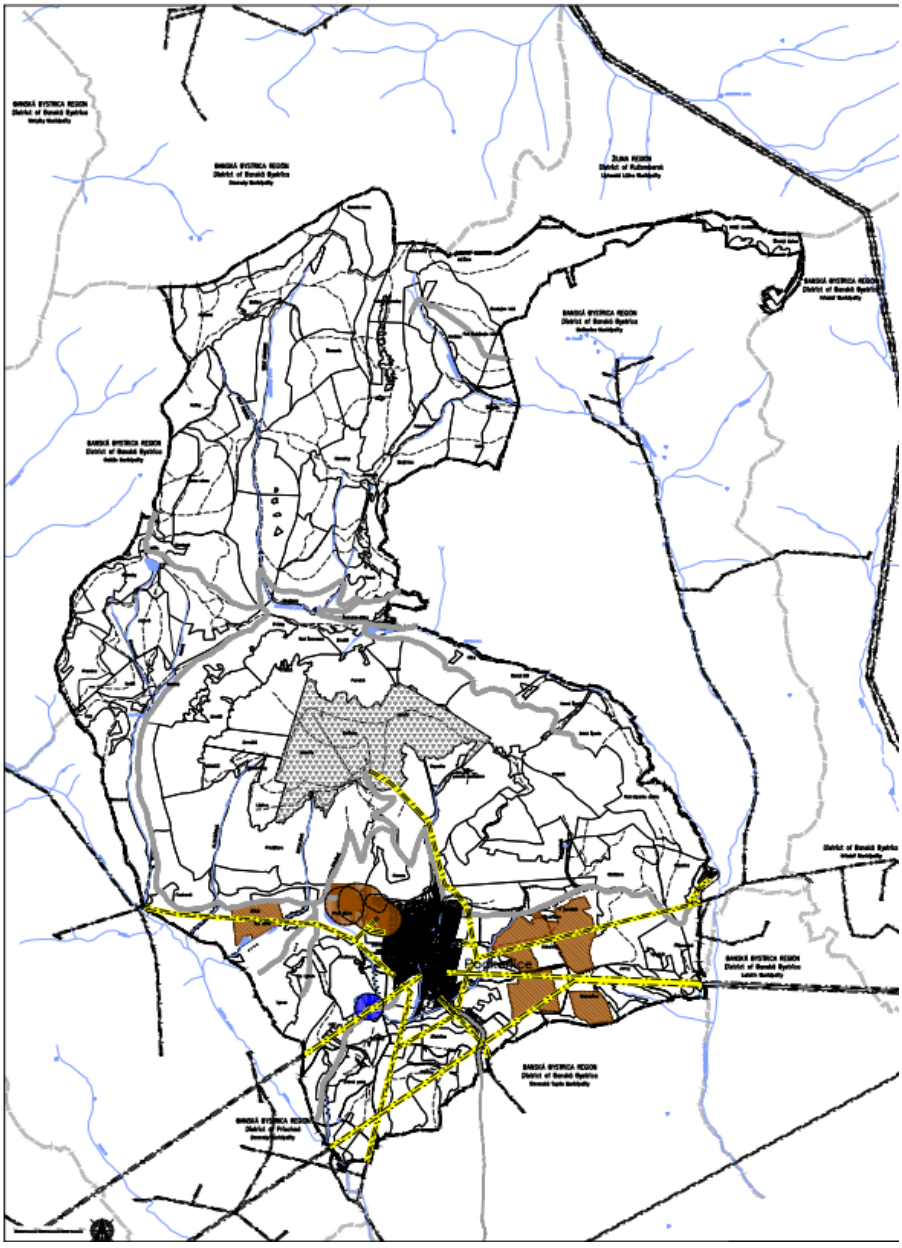
Fig. 5: Synthesis of elements supporting activities related to tourism.

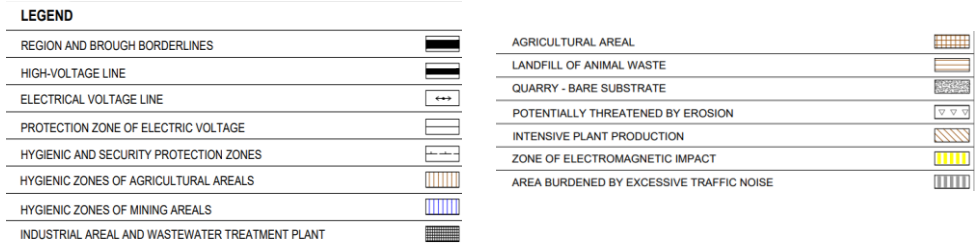




From the point of view of real soil erosion, the current erosion is particularly important, which manifests itself to varying degrees in the area of interest, already on slopes with a slope of more than 3°, where arable land occurs in small and large blocks. The anti-erosion effect of small-block arable land is relatively sufficient due to its fragmentation and crop rotation, therefore we suggest carrying out anti-erosion measures only on arable land used for large-scale production, on slopes with a slope of more than 7° where current erosion at the edges of arable land parcels reaches 12 t/ha/year (soil 8th group). When the borders of the arable land plots are inappropriately determined, their marginal part of the soil of the 9th group, with a large inclination of the slopes (12-25°), where the current soil erosion reaches values of 15-20 (even more) t/ha/year, forms their marginal part. These parts need to be stabilized with strips of anti-erosion vegetation. Information about potential soil erosion is important from the point of view of locating areas with a high susceptibility to the action of erosion, in case of removal of the current vegetation cover. However, the group of areas potentially threatened by soil erosion includes almost all the forest stands of the treated area, because they are mainly located on slopes with a slope of more than 7°. For this reason, it is very important to apply such management methods in forest stands that exclude extensive removal of vegetation cover and the occurrence of erosion.

Fig. 6: Synthesis of elements limiting activities related to tourism

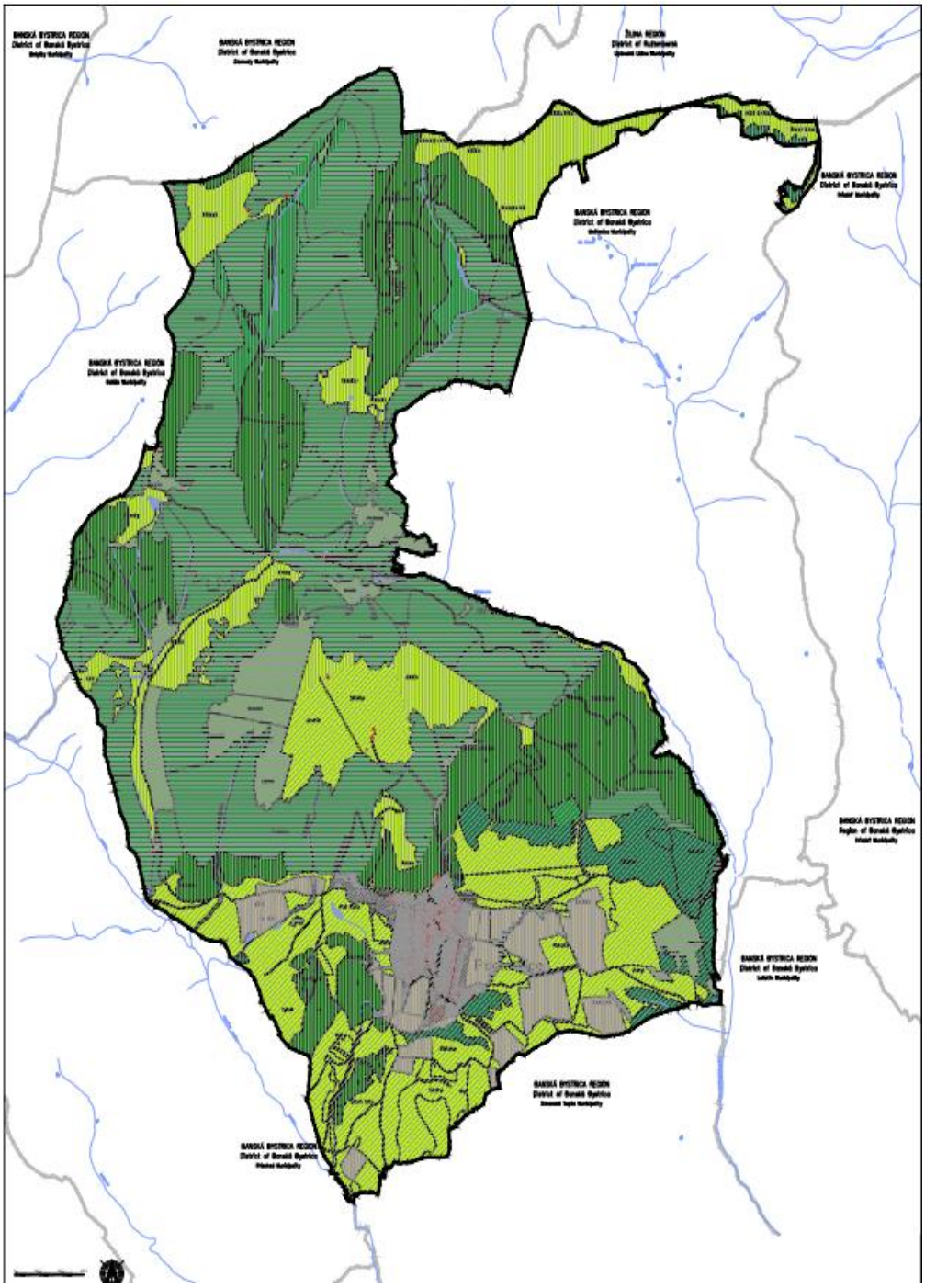


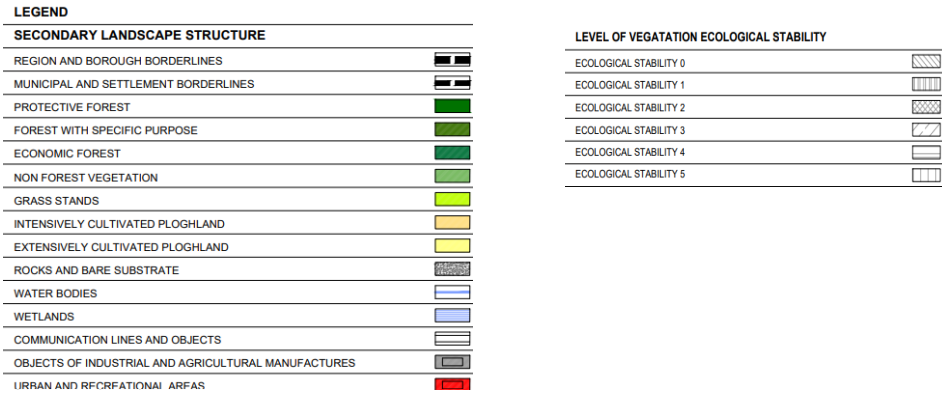


Landscape structure types with eco-stabilisation function.

We have identified landscape structure types and their degrees of eco-stabilisation function. Natural forests, natural meadows, wetlands, rocks, rock communities on natural meadows and natural water courses are the most eco stable locations with a rich diversity of plant and animal species (ecological stability 5). In addition to these locations, the area of interest also has a significant presence of areas with ecological stability 4 (areas that are ecologically very stable). Their importance from the point of view of eco-stabilization action lies mainly in the fact that they occupy a relatively large part of the area of study area. These are semi-natural forests, natural landscape greenery, natural meadows and pastures), natural areas lying on ice, waterways close to nature and also the edges of forests successively encroaching on the open landscape. From the point of view of the eco-stabilization action in the open landscape, the structure of non-forest and woody vegetation is of great importance, which is enhanced by the fact that these are mostly natural types of linear greenery, which, due to their structure, construction and spatial distribution, are suitable for fulfilling the function of biocorridors, interactive and anti-erosion elements. This is mainly the riparian vegetation of the Podkonické stream (flow number 153), which flows through the cadastral and entire built-up area of the village (it is regulated and covered in the central part of the village), the Moštenické stream in the northern part of the cadastre, the Ľupčica stream in the western part of the cadastre, the Uhliarske stream in the northeastern part of the cadastre as well as accompanying green belts in agricultural land.

Fig. 7: Types of landscape structures with ecostabilising function





Determination of suitable activities related to recreation and tourism according to environmental limits

We have selected activities relevant to the development of rural tourism and recreation, mostly with a tradition aspect. A total of 20 (see tab. 3) activities were proposed.

Table 3: Proposal of activities based on supporting and limiting factors for tourism development

Code	Land cover/Land use elements
Forest management	
L1	Intensive forest management
L2	Extensive forest management
L3	Protected forests
Agriculture	
O1	Arable land – large blocks
O2	Arable land – small fields
K1	Extensive meadows
K2	Intensive meadows
P1	Extensive pastures
P2	Intensive pastures
S1	Gardens
S2	Orchards
Recreation and sport	
R1	Cottage areas
R2	Sport open areas
R3	Sport infrastrucure
R4	Cultural, social and sport events
R5	Walking
R6	Knowledge tourism
R7	Hunting
R8	Cross-country ski
R9	Downhill ski

As part of the processing of the decision-making process for the development of rural recreation and tourism, three levels of suitability/unsuitability limits of the implementation of these activities on the given area were chosen expressed by „point value indicators“, namely:

O – the implementation of the activity is excluded on the given area,

L – the implementation of the activity is less suitable on the given area, t. j. realization is possible under certain precisely defined conditions and measures,

1– realization of socio-economic activity is appropriate on the given area.

These point value indicators were assigned to individual features of the landscape and territory, the sum total of which classifies the landscape segment into three possible categories of the recreational value of the territory. Examples of environmental limits are presented in the decision -tables in the Supplement.

Proposals for environmentally friendly development of rural recreation and tourism development

In order to finalize proposals for environmentally friendly development of rural recreation and tourism development in Podkonice village we selected the proposed activities from the decision tables and transferred them to the map documents.

We determined the degrees of suitability for the proposed activities for individual categories of limits, which result from factors supporting and limiting the development of activities related to the development of tourism. The results of proposed activities that result from the abiotic features of the landscape, from the elements of territorial protection of the landscape and nature, from the protection of natural resources, and the territorial presentation of stress factors are clearly presented in the table below. Suggested, restricted, and excluded activities are listed for each numerical code.

In the following overview, we present tabular examples of proposed activities for all types of limits (supporting, limiting and exluding factors for the development of tourism in the village of Podkonice (tab. 4) The localization of a given social activity can be limited or limited by one, two or more factors. The determination of limiting factors for a given activity is based on the assessment of the functional relationship between all the mentioned properties of the territorial elements, socioeconomic complex, and the required social activity. If the proposed activity is limited or restricted by at least one feature, then it is not feasible in the given area.

These partial activity proposals are the basis for an alternative ecological selection of activities.

Table 4: Proposal of environmentally friendly activities

Factors	Supported activities	Limited activities	Excluded activities
Large protected areas	L2 L3 K1 R6 R7	L1 K2 P1 R1 R5 R8 R9	O1 O2 P2 S2 R2 R3 R4
Small protected areas	L3	K1 R6 R7	L1 L2 O1 O2 K2 P1 P2 S1 S2 R1 R2 R3 R4 R5 R8 R9
Protected area buffer zone	L3 K1	R6 R7 R8 R9	L1 L2 O1 O2 K2 P1 P2 S1 S2 R1 R2 R3 R4 R5
Territorial systém of ecological stability	L3 O2 K1 P1	L2 O1 K2 P2 S1 S2 R5 R6 R7 R8 R9	L1 R1 R2 R3 R4
Arable land of best quality	O1 O2 S2	L3 K1 K2 P1 S1 R2 R5 R6 R7	L1 L2 P2 R1 R3 R4 R8 R9
Non forest vegetation and meadows	K1 K2 P1 P2 R5 R6 R7 R8	L2 S2	L1 L3 O1 O2 S1 R1 R2 R3 R4 R9
Economic forests	L2 L3 R6 R7	L1 R1 R3 R4 R5	O1 O2 K1 K2 P1 P2 S1 S2 R2 R8 R9
Protected forests	L3	L2 R6 R7	L1 O1 O2 K1 K2 P1 P2 S1 S2 R1 R2 R3 R4 R5 R8 R9

The goal of alternative ecological selection is to determine a set of activities that can be implemented in the study area, i.e. j. they are not limited by any feature of the landscape-forming components (in the decision-making tables they are marked with code 1 – proposed activities), or they can be implemented under certain established conditions (in the decision-making tables they are expressed by code L – limited).

The resulting alternative landscape-ecological design means that for each area of the given territory, we determine, on the basis of a synthesis of unlimited activities according to the indicated indicators:

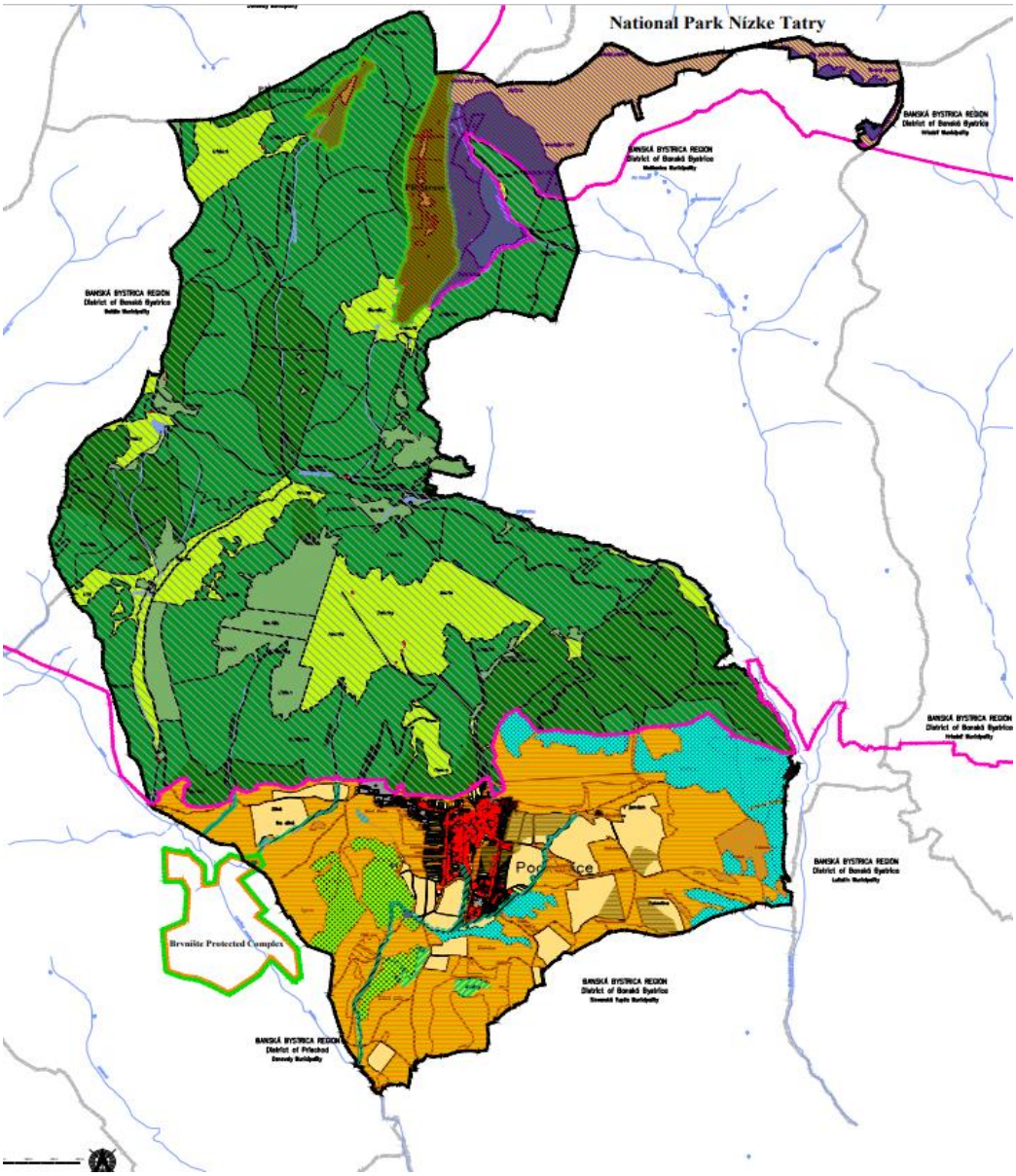
• those activities which, from a landscape-ecological point of view, are most suitable for implementation on the given plot,

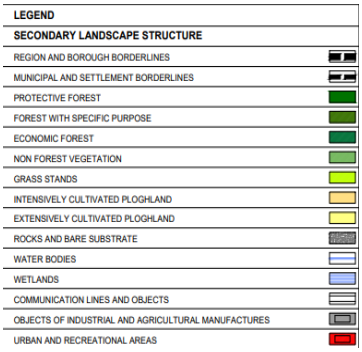
• those activities which can be localized from a landscape-ecological point of view, but under certain - restrictive conditions with compliance with a strict management regime, with established technologies, etc.,

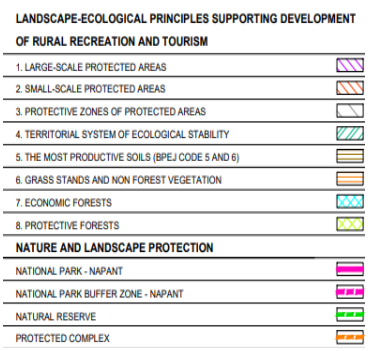
• those activities which, from a landscape-ecological point of view, cannot be located on the given plot.

The result of the proposal is an ecological alternative selection of activities, where we propose suitability for forestry, agricultural and urbanization activities with an emphasis on the development possibilities of selected forms of tourism (recreational and leisure, sports, knowledge tourism, etc.) An overview of alternative ecological proposals for homogeneous spatial units is given in Fig. 8 and 9.

Fig. 8: Landscape ecological regulatives for rural recreation and tourism development




LEGEND
SECONDARY LANDSCAPE STRUCTURE
REGION AND BOROUGH BORDERLINES
MUNICIPAL AND SETTLEMENT BORDERLINES
PROTECTIVE FOREST
FOREST WITH SPECIFIC PURPOSE
ECONOMIC FOREST
NON FOREST VEGETATION
GRASS STANDS
INTENSIVELY CULTIVATED PLOGHLAND
EXTENSIVELY CULTIVATED PLOGHLAND
ROCKS AND BARE SUBSTRATE
WATER BODIES
WETLANDS
COMMUNICATION LINES AND OBJECTS
OBJECTS OF INDUSTRIAL AND AGRICULTURAL MANUFACTURES
URBAN AND RECREATIONAL AREAS


LANDSCAPE-ECOLOGICAL PRINCIPLES SUPPORTING DEVELOPMENT OF RURAL RECREATION AND TOURISM
1. LARGE-SCALE PROTECTED AREAS
2. SMALL-SCALE PROTECTED AREAS
3. PROTECTIVE ZONES OF PROTECTED AREAS
4. TERRITORIAL SYSTEM OF ECOLOGICAL STABILITY
5. THE MOST PRODUCTIVE SOILS (BPEJ CODE 5 AND 6)
6. GRASS STANDS AND NON FOREST VEGETATION
7. ECONOMIC FORESTS
8. PROTECTIVE FORESTS
NATURE AND LANDSCAPE PROTECTION
NATIONAL PARK - NAPANT
NATIONAL PARK BUFFER ZONE - NAPANT
NATURAL RESERVE
PROTECTED COMPLEX

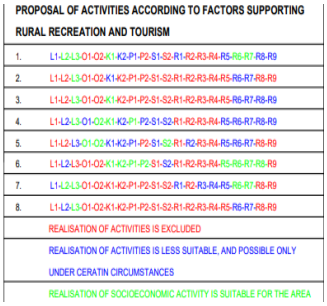
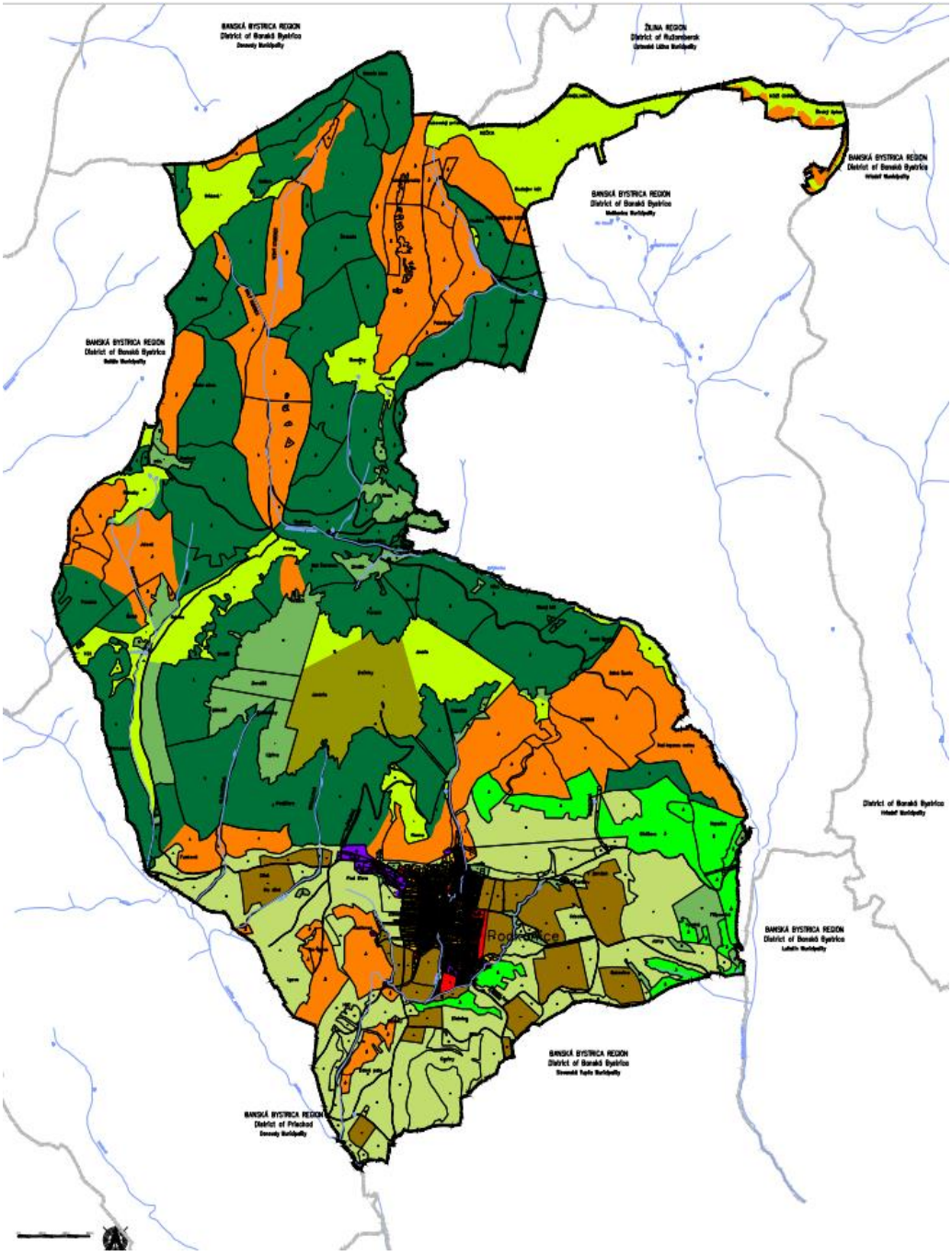
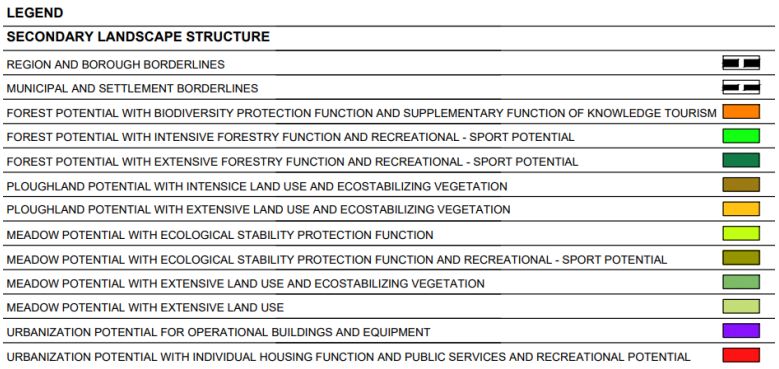

PROPOSAL OF ACTIVITIES ACCORDING TO FACTORS SUPPORTING RURAL RECREATION AND TOURISM
1. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
2. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
3. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
4. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
5. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
6. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
7. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
8. L1-L2-L3-O1-O2-K1-K2-P1-P2-S1-S2-R1-R2-R3-R4-R5-R6-R7-R8-R9
REALISATION OF ACTIVITIES IS EXCLUDED
REALISATION OF ACTIVITIES IS LESS SUITABLE, AND POSSIBLE ONLY UNDER CERATIN CIRCUMSTANCES
REALISATION OF SOCIOECONOMIC ACTIVITY IS SUITABLE FOR THE AREA

Fig. 9: Proposal of potential types for rural recreation and tourism development





DISCUSSION

Scientific research, but also the social requirements for recreation and the development of tourism in the natural environment is clearly increasing. In recent periods, a lot of knowledge, publications, and approaches have been presented in this field. These take into account the factors of quality and readiness of the territory, the program of comprehensive provision of services, the information system of protection, and ongoing care of recreation areas. The search for compromise solutions for the recreational use of valuable segments of, Rural tourism is an important and growing segment of the tourism industry globally, and it has received attention from researchers and policymakers in recent years. Many authors contributed to the discussion on rural tourism and sustainable development, highlighting the importance of balancing economic growth with environmental and social considerations as well as the strategies and policies that can be used to support its sustainable development. Zhang *et al*. (2020) argued that sustainable tourism practices can help mitigate the negative environmental impacts of tourism in rural areas. They note that strategies such as promoting low-carbon transportation, using eco-friendly accommodations, and encouraging responsible tourist behavior can all contribute to sustainable tourism development. Arriaza & Tulla (2019) noted that rural tourism can provide opportunities for entrepreneurship, job creation, and the preservation of cultural heritage. Furthermore, Leimgruber (2021) emphasized the need to balance economic development with the preservation of local traditions and values.

Approaches and methods for evaluating the prerequisites of the landscape and the defined recreational area in terms of the offer for the implementation of recreational activities have been developing since the 1960s and 1970s. The assessment is either descriptive, scoring, exact mathematical, or even economic in nature, which expresses the value of the territory in terms of prices, such as payments for the ecosystem services of the recreation area. Kiemsted (1967 in Sláviková (1978)) evaluates the territory according to four criteria - the effect of the border of the forest and the water surface, the effect and features of the relief, the effect of the landscape structure and use of the territory and climate values. Semiatkowska and Kaczmarska (1968 in Sláviková (1978)) state two main evaluation criteria - selected recreational activities - hiking, relaxation, spa treatment; characteristics of the natural environment – physical and geographical conditions, climate, the attractiveness of the landscape, mineral and thermal springs, water bodies for swimming and the presence of forest. Douglass (1975) uses two groups of criteria - basic (space, environment, accessibility) and specific (attractiveness of the environment, natural resources, suitable vegetation).

Míchal & Nosková (1970) assess the territory from map documents divided into 2.4 km squares, in which they evaluate landscape elements with the allocation of preference points

and indices according to climatic conditions, the area share of land fund usability for recreation, relief energy from the aspect of landscape perception, length edges of water bodies and streams and the length of forest edges. According to the number of points obtained, the territory is divided into four value groups for the performance of recreation.

Papánek (1972) is considered the highest scientific authority at the time, he elaborated on the recreational potential of the country using a mathematical-economic model, thus including a price expression (in today's terminology as the price for ecosystem services). He calculated the recreational potential as the possible annual income from recreation in the forest in 1 year. He used eighteen criteria for the country's recreational potential for evaluation. The degree of attractiveness of the territory for the visitors was assessed according to twelve criteria - tourism and physical recreation, swimming and water sports, skiing and winter sports, water area, water courses, mineral and thermal waters, surface features of the relief, rock formations and caves, forest cover, and forest communities, hunting and game, cultural and historical monuments, stress factors of the territory. Sláviková (1978) was based on Papánek's methodology with the aim of simplifying the approach, grouping similar criteria, and transferring the assessment to a wider landscape level. To evaluate the territory, it used the following criteria: relief, climate, forests, assessment of non-forest woody vegetation in the country, grasslands and field crops, assessment of fauna, socio-economic components, information symbols, cultural-historical monuments, and stress factors in the country.

Miazdra *et al.* (1982) first used the term valorization of the territory, the aim of which was to determine the main functional focus of the areas, to determine the degree of suitability of the territory for certain types of recreational activities, and to allocate a hierarchy of functional zones (space, area, location).

Mariot (1989) comprehensively presents the results of longer-term research and evaluates the potential of the country in terms of the possibility of use for tourism. It divides the evaluation criteria into localization (relief, climate, water, flora, fauna, cultural monuments), selective (economic, residential, social, and political prerequisites), and implementation (material and technical base, communications, nature protection, environmental barriers).

A brief look into the development of modern approaches and methodologies documents us that the degree of detail of sphere indicators varies according to different authors, respectively. the spectrum of indicators changes. Kalinová (2006) evaluated the recreational potential using the methodology of LANDEP. Kubalíková *et al.* developed a complex approach to geodiversity and landscape in order to foster geoconservation and develop geotourism and geoeducation noting that this approach is more effective than isolated protection and promotion of geoheritage sites.

Point value indicators are assigned to individual features of the landscape and territory, the sum total of which classifies the landscape segment into three possible categories of the recreational value of the territory.

New approaches to the evaluation of the recreation potential of the territory from the point of view of the senior category and handicapped recreation participants are interesting. For these categories, space must be adequately prepared, purpose-built equipment with support facilities, and a specific experiential and educational program (Fialová & Loučková, 2010). Today, the population group of seniors makes up an increased share of the group of all recreation participants, therefore great emphasis is placed on making areas, often protected, accessible. Kowalska (2019) calls this category silver-haired tourists, and the target program for them is the promotion of active health, improvement of quality of life, creative education, enrichment with new discoveries, and cultural and social contact. Logically, there is an

increasing interest, especially among the middle and older categories of tourists, in high-quality and high-value parts of nature, which is a natural desire for further education and experience. Many of them are strictly protected by law. This issue is analyzed in detail by a group of authors under the conditions of Slovakia (Švajda & Sabo, 2013; Kolačkovská *et al.*, 2019). In the European context of the relationship between tourism development and protected areas management several authors noted that sustainable tourism development requires a holistic approach (Gossling & Scott; 2020; Mazzola *et al*., 2018) that takes into account also a collaboration between various stakeholders including local communities, government agencies and tourism operators (Freitas & Almeida, 2017)

CONCLUSION

Environmentally friendly development of rural recreation and tourism in the study area is based on several principles, it is a comprehensive reassessment of the landscape from a geographical, ecological, environmental, aesthetic, and organizational-operational point of view.

The village of Podkonice has an important geographical location. The spatial development possibilities of all economic activities with recreational potential were re-evaluated from the point of view of environmental limits, which took into account natural, cultural-historical potential, environmental hygiene, the presence of protected areas, elements of territorial systems of ecological stability, and important biotopes. The development of a tourism development project requires ongoing cooperation with local governments and citizens, as well as the gradual incorporation of results into the spatial planning documentation of the affected cities and municipalities.

The overall natural wealth with forests, meadows, and pastures, large areas of forests for recreation, and a sufficient amount of greenery in the inner village mean a significant potential for the development of tourism in the area under consideration. At the same time, however, they represent a risk of disturbing the rare ecosystems of the cadastre, since the municipality does not have a landscape plan or an up-to-date spatial plan. The development of tourist activities only on the basis of the elaborated Program of Economic and Social Development of the municipality without their consistent localization means a real risk.

Uncontrollable and environmentally unacceptable development of recreational activities in the village could lead to the destruction of the values of its natural and cultural wealth. Therefore, it would be necessary to develop relevant documentation in the form of participatory planning with the aim of developing rural recreation and tourism based on landscape-ecological and landscape-architectural proposals. A suitable form would also be meetings with citizens to fulfill the principle of participatory planning and meetings with mayors from a wider background for the purpose of better coordination of landscape plans and plans for the development of recreation and tourism in the entire micro-region.

FUNDING

This research was funded by the grant VEGA 1/0736/21 of the Scientific Grant Agency of the Ministry of Education Science Research and Sport of the Slovak Republic and the Slovak Academy of Sciences

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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