

## TRADITIONAL AGRICULTURAL LANDSCAPE OF LIPTOVSKÁ TEPLIČKA VILLAGE: IDENTIFICATION AND PROTECTION OF DIVERSITY

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### Abstract

The paper focuses on traditional agricultural landscape (TAL) of arable land and grasslands in Slovakia. The results are based on field case study research in Liptovská Teplička village. Special emphasis is put on the identification of landscape and species diversity, interlinking them with the nature protection strategy. Contemporary nature protection of Liptovská Teplička village is mostly oriented towards nature habitats. The results of case study research underline that improvement needs to be focused on the preservation of TAL types which are currently subjected only to minimal protection.

**Key words:** traditional agricultural landscape, cultural landscape, landscape diversity, nature protected areas, Liptovská Teplička, Slovakia

## TRADICIONALNA KMETIJSKA POKRAJINA V VASI LIPTOVSKÁ TEPLIČKA NA SLOVAŠKEM: PREPOZNAVANJE IN VAROVANJE RAZNOVRSTNOSTI

### Izvleček

Članek se osredotoča na tradicionalno kmetijsko pokrajino (TKP) na obdelovalnih tleh in travnikih. Rezultati temeljijo na terenski raziskavi v katastrski občini Liptovská Teplička. Posebna pozornost je namenjena prepoznavanju pokrajinske raznolikosti in biodiverzitet ter njunemu povezovanju s strategijo varovanja narave. Na preučevanem območju je obstoječe varovanje narave usmerjeno predvsem k varovanju naravnih habitatov. Rezultati študije poudarjajo, da se je v prihodnosti potrebno usmeriti k zaščiti vseh tipov TKP, ki so v sedanjosti zaščiteni v najmanjši možni meri.

**Ključne besede:** tradicionalna kmetijska pokrajina, kulturna pokrajina, pokrajinska raznolikost, varovana območja narave, Liptovská Teplička, Slovaška

## I INTRODUCTION

The landscape of Slovakia is characterized by a rich landscape diversity, together with plant and animal biodiversity as well. The diversity is mostly based on natural conditions and has been constantly transformed by human economic activities. The vast majority of the agricultural landscape in Slovakia has been affected by collectivisation and other developmental activities such as industry, transport and urbanisation (Bezák, Mitchley, 2014). The remnants of traditional agricultural landscapes (TALs) have been preserved mostly as small patches in less accessible rural areas and they document the long-evolving relationships between humans and landscape (Lieskovský et al., 2014). TALs consist of mosaics of small-scale arable fields and permanent agricultural cultivation modes such as grasslands, vineyards and high trunk orchards. TALs are also important from the landscape diversity and protection of plant and animal biodiversity point of view. Based on the results of TALs inventory, four main types were distinguished in Slovakia (Špulerová et al., 2011):

- TAL with dispersed settlements, characterized by the presence of mosaics of arable land, grassland, orchards and buildings of dispersed settlements;
- TAL of vineyards, characterized by presence of vineyards, arable land, grassland or orchards;
- TAL of arable land, grasslands and orchards, characterized by dominance of orchards and presence of grassland or arable land;
- TAL of arable land and grasslands consisting only from mosaics of arable lands and/or grassland.

The presence of specific land use elements such as dispersed settlements, vineyards, orchards and the ratio between arable land and grasslands, significantly influence the structure and character of individual TAL sites (Mojšes, Petrovič, 2013; Munteanu et al., 2014). The most important sources of biodiversity are related to field bounds, stone walls, terraces, also grasslands and roads adjacent to fields (Dobrovodská, 2006) as well as grasslands in undisturbed and unfertilized sites with a long history of management (Imrichová, 2006).

TALs with valuable habitats are not protected by special legislative protection in Slovakia, i.e. a fact which might cause the loss of biodiversity connected to these specific habitats as a consequence of succession and overgrowth of TALs by shrubs and trees (Špulerová et al., 2013). To stop this negative trend, a project was set-up aimed at developing a strategy for protection of traditional agricultural landscapes (see acknowledgment). In this paper attention is given to extensively cultivated farmland and TAL of arable land and grasslands, which is characterized by a higher diversity of landscape pattern and by the presence of semi-natural habitats that significantly contribute to the provision of ecological functions in the landscape and provide multifunctional ecosystem services to society. Liptovská Teplička cadastral community represents a rural area of high landscape-ecological and biodiversity value (Dobrovodská, 2014). Special focus is given to the identification of nature protection measures which may contribute to protection and preservation of TAL.

## 2 METHOD AND CASE STUDY AREA

For the purposes of our paper a TAL of arable land and grassland was surveyed. TAL is defined as a structure of extensively cultivated fields, meadows, pastures, orchards and vineyards, or recently abandoned plots in the early stages of succession which have been unaffected by agricultural collectivisation. TAL is characterized by small-scale structure of plot division, and by ways of using the land which remained unchanged by socialistic collectivisation, or by preserved forms of anthropogenic relief, or by preserved features of traditional agricultural technologies. The TAL sites in this paper were mapped according to the handbook produced for countryside inventory of TALs throughout the entire territory of Slovakia (Dobrovodská, Špulerová, Štefunková, 2010).

The cadastral community of the Liptovská Teplička village covers an area of 9,869 ha and is located below the ridge of the Low Tatras at altitudes of 846 to 1429 m a.s.l. Administratively the territory is a part of Prešov region, Poprad district. The village was established in 1634. In the past the population was mostly engaged in agriculture, especially in cattle and sheep breeding, but also in forestry, rafting and tanning (Encyklopédia miest ..., 2005). The village itself has maintained its agricultural character up to the present day. The Liptovská Teplička village had a population of 2,373 in 2014 (Dobrovodská, 2014) and statistics confirm a population increase in the wider rural settlement area. With regard to age structure, 60% of the population is of productive, 25% of pre-productive and only 15% is of post-productive age. Among the economically active inhabitants, the most common areas of occupation are manufacturing (195), forestry, logging and related services (185), agriculture and tourism (70).

The population of Liptovská Teplička village has two notable strengths. The first is the historical diligence of the local people, with their common sense and ability to utilize rational approaches in developing their domestic region. The second is reflected in favourable demographics, with a predominantly working-age population: several middle and younger generations have migrated to work or have studied outside the region and have returned later in life, creating a pool of potential workers for the agricultural sector able to replace the older farmers when they retire.

Liptovská Teplička village belongs to the type of rural settlements which retains agricultural production carried by individual farmers, with a prevalence of livestock farming (Repka et al., 1994). The existence of narrow strip parcels in this area was conditioned by the less favourable natural conditions for agriculture, particularly the steep relief of the area. The dominant form of the present landscape structures is grassland, varying in type of land use as intensively or extensively utilized meadows or pastures, some of them tessellated. The village was also affected by the collectivisation of agriculture, many barns and shepherd huts were removed and part of the terraced and mosaic landscape was transformed into large-block fields or grassland.

Traces of preserved traditional agriculture in this TAL remain in five different types of mosaic under different management intensity and with the presence of various balks: extensively utilized meadows, abandoned meadows and pastures, extensively utilized pastures, abandoned pastures and mosaics of meadows and arable fields. The dominant TAL structure

in Liptovská Teplička village is extensively utilized meadows with either muddy-rocky terraces or rocky mounds. Extensive agriculture and organic farming have affected the species richness of grass-covered former arable fields (Špulerová et al., 2013).

Regarding nature protection measures, this paper is focused on two perspectives. Firstly, on the landscape segments covered by legislative measures for the protection of nature and landscape at the national and international level under the Act no. 543/2002 Coll. on nature and landscape protection. These are measures concerning the network of national protected areas, Natura 2000 locations (European network of protected areas), species protection, significant habitats and elements of territorial systems of ecological stability (bio-centres and corridors). Evaluation of legislative measures that protect natural and historical resources is focussed on legislative measures on protected water, soil and protected forest resources, and on legislative measures to protect cultural and historical monuments. Secondly, emphasis is on the ecologically important landscape segments without legislative protection, in this case wetlands and cultural-historical landscape elements.

## 3 RESULTS: IDENTIFICATION AND PROTECTION OF DIVERSITY

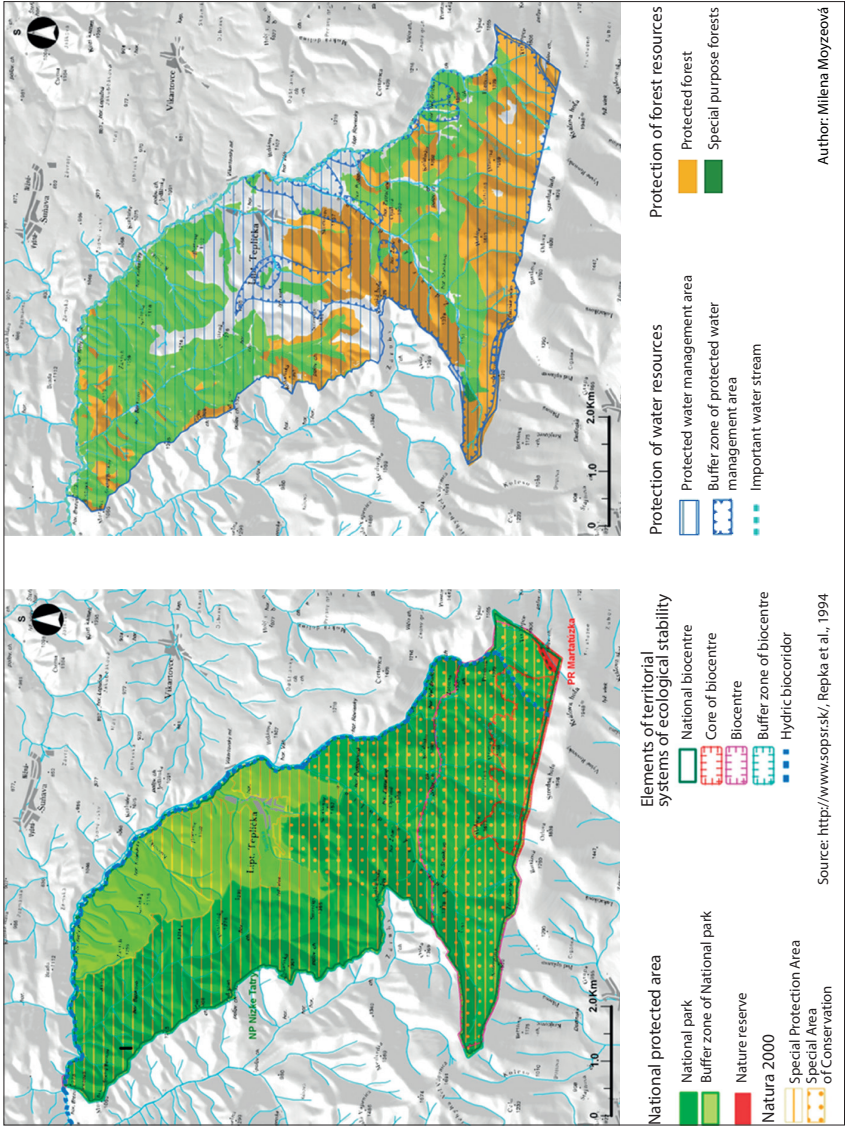
### 3.1 Identification of landscape diversity and localization of nature protection areas

In Liptovská Teplička cadastral community, the vegetation of grassland and bounds, generated as a result of agricultural activities, is characterized by high species diversity and semi-natural character (Ružičková, Dobrovodská, Valachovič, 1999). In terms of territorial nature protection, the case study area is located in the Low Tatras National Park (3rd degree of protection) and its protection zone (2nd degree of protection). The nature reserve Martalúžka (5th degree of protection) is situated in the southern part of the cadastral community. It consists of habitats ranging from transition forest to alpine meadows, rich in plant and animal species (Figure 1).

The landscape-ecological value of the case study area has been increased by the presence of Natura 2000 sites. These are the Special Area of Conservation (SAC) Kráľovohol'ské Nízke Tatry and the Special Protection Area (SPA) Nízke Tatry, designated under the Habitats directive and the Birds directive, respectively, as containing some of Europe's most valuable and threatened species and habitats. These protected areas constitute elements of a territorial system of ecological stability. The Kráľovohol'ská part of the Low Tatras National Park is a biocentre of national significance and the watercourse of Čierny Váh is a hydrological bio-corridor of regional importance.

These ecologically significant elements together with historical and cultural features of the landscape have not yet been protected by legislation, but in terms of the landscape value they need to be maintained in this area. Ecologically significant elements include two wetland sites of local importance. These are the wetlands near the Čierny Váh (area 2,300 m<sup>2</sup>) and the Ždiarsky Potok creek (area 450 m<sup>2</sup>). Both sites are hatching place for

Figure 1: Cadastral community of Liptovská Teplička with designated nature protection areas  
Slika 1: (Za)varovana območja katastrske občine Liptovská Teplička



amphibians and are of local hydrological and eco-stabilizing value. Significant cultural and historical landscape elements are present in the form of terraced grasslands with tree and shrub vegetation and a mosaic of small-scale arable fields and grassland located around the built-up part of the village. Part of the historical landscape structure are the wooden barns and about 500 earth cellars located on the slope behind the built-up areas of the municipality. Two-meters-deep cellars are still used to store the harvest of potatoes, vegetables and flowers, as they keep a stable temperature throughout the year.

Field surveys conducted in the case study area confirmed the significance of the existence of a TAL area in terms of biodiversity. Vegetation of grassland and mounds is present, with three habitat types of European importance found: species-rich *Nardus* grasslands on siliceous substrates in mountain areas and submountain areas in continental Europe, lowland hay meadows, and mountain hay meadows. One habitat of national importance was also identified, i.e. mesophile pastures. The best management for such habitats, and which is in fact applied in this area, is regular cutting or grazing. These ecosystems represent a refuge for many rare and endangered species, as shown by statistics from field records (Špulerová et al., 2011):

- 19 vascular plants which are endangered according to the Slovak Red List (Feráková, Maglocký, Marhold, 2001), seven of them protected according to national law under the Regulation of Ministry of the Environment (No. 579/2008 of Col.);
- three bird species of European importance according to the Birds Directive (Directive 2009/147/EC) and one mollusc species of European importance according to the Habitat Directive;
- a list of other animal species included in the National Red List: seven bird species (Aves), six species of beetles (Coleoptera), three species of grasshoppers (Orthoptera), three species of millipedes (Diplopoda) and ten species of spiders (Araneae).

The presence of protected areas in the case study area implies the presence of natural or semi-natural ecosystems. To determine whether and how much the protected areas have a positive impact on environmental quality requires determining how much they discourage human activities that threaten their status. The area of traditional agricultural landscape under discussion is located in the protection zone of the Low Tatras National Park, which represents the lowest degree of protection.

### 3.2 Contemporary protection of natural, cultural and historical resources

The quality of the environment in the Liptovská Teplička case study area is determined by the occurrence of natural resources (Figure 2). We analysed the occurrence of water, soil and forest resources. From the hydrological point of view, the territory belongs to the basin of the main stem of the Váh river and the sub-basins of the tributary Čierny Váh. The whole surveyed area is located in a protected water management area (PWMA), that of the eastern part of the Low Tatras, with an area of 805 km<sup>2</sup>, with a usable quantity of surface and ground water resources of 4.76 m<sup>3</sup>/s. A small part of the southeastern



corner of the Liptovská Teplička territory extends to the PWMA upper catchment area of the Hnilec river. Several water sources are situated in the case study area that are used to supply the population with drinking water from springs – a major spring Bruno with a protected zone of 7,259 ha, a spring above the village (area of protected zone 31.7 ha), the spring Macová (area of protected zone 59 ha), the spring Small Brunov-Bočný Brunov (area of protected zone 90 ha), as well as several boreholes: Rovníčky – four boreholes (area of protected zone 71.4 ha), Borehole LT 19 (area of protected zone 20 ha), two boreholes – LT20 and LT21 (area of protected zone 45 ha). These groundwater resources provide high-quality water that complies with drinking water standards. 90 to 95% of the population in Liptovská Teplička village is supplied from public water supply system. The village has built a local water supply, managed by the Podtatranská Water Company, which supplies other towns in the Tatry region as Spišská Nová Ves, Kežmarok and Poprad. Despite this main water supply, however, some of the locals – particularly in the upper parts of the village named Kobyliarky, Na Hálkoch, and Štefanov – dig their own wells even today.

Forests cover 5,086.66 ha, which is 83.6% of the study area. In addition to production forests, two other categories of forests are present: protective forests (2,824.8 ha or 57% of the forest area) and special purpose forests (47.5 ha or nearly 1% of the forest area). We identified four categories of protective forests: forests on extreme sites (constituting an area of 657.29 ha; 13% of the total forested area), the mountain forests of the upper treeline (1,557.32 ha or 32% of the forest area), the forests of the dwarf pine zone (552.31 ha; 11% of the forest area), and other forests with significant soil protection function (57.89 ha; 1% of the forest area). Special purpose forests are designed to establish gene reserve for forest tree species.

The best quality soils, of the first to the fourth quality grade, which are protected under the law, are not found in the Liptovská Teplička cadastral community. There are only soils with low and average site quality, with low humus content (Bielek, 2002). They are as follows: cambisol podzol (northern part of cadastral community), redzic cambisol (central part), cambisol modal acid (western part), cambisol redzic (on the south) and modal podzols and humus-iron (southern and southeastern part of cadastral community; Šály and Šurina, 2002). The soil texture is sandy loam (northern and southern part) and loam (central part of the cadastral community; Čurlík and Šály, 2002).

Despite the low soil quality, agriculture has a rich tradition in the area. The land is managed by small farmers and the Agricultural Cooperative of Liptovská Teplička, who practise organic farming on about 60 ha of land. They cultivate mainly cereal oats, wheat and feed grain. In recent years farmers have produced organic spelt and buckwheat. The alluvial soil around Čierny Váh is not used, because there is a high level of water, and the soils are waterlogged. The agricultural cooperative maintains conservation of grassland habitats on the traditional grassland mosaics, thus increasing the landscape-ecological value of the area. The current state of grassland habitats is quite favourable, so for ongoing TAL preservation we recommend maintaining the current and proposed management measures and principles of the Agricultural Cooperative of Liptovská Teplička's organic farming, which are ably supported by agri-environmental schemes. The schemes include

support measures concerning species-rich grassland, less favoured areas, and organic farming, all of which apply to Liptovská Teplička.

In terms of the presence of cultural and historical resources, the locomotive depot and surrounding area (declared as a national cultural monument in 1989) is situated on the outskirts of the village. This area contains four historical objects: the caretaker's house (an area of 26 m<sup>2</sup>), the railway station (60 m<sup>2</sup>), a rustic house (58 m<sup>2</sup>), and a locomotive depot (146 m<sup>2</sup>). They were built in 1919 and represent local folk architecture with a rectangular floor plan. Terraces, mounds and combined terraces with collected rocks with different heights and compositions have been erected here since 1634. The part of Liptovská Teplička cadastral community which contains these features forms a landscape with characteristic mosaics of small strip fields and balks, which has not lost its historical cultural and agricultural form (Dobrovodská, 2014).

## 4 CONCLUSION

The Liptovská Teplička cadastral community has preserved the traditional agricultural landscape and original objects of folk architecture such as barns and potato cellars. These traditional and valuable parts of agrarian culture have gradually ceased their productive functions in society, but they should be considered as a cultural heritage, as the physical, social, and spiritual values of the creative work of previous generations (Slavkovský, 2002). Their presence in Liptovská Teplička contributes to increasing landscape diversity and overall environmental quality of this mountain village.

The indicated measures of nature protection and protection of the natural resources, cultural and historical monuments in Liptovská Teplička village have increased the significance, stability and biodiversity of the landscape, the quality of the environment and the quality of human life. The protection of natural and historical resources is oriented towards protection of natural habitats, protected water and forest resources and historical monuments. These contribute to the preservation of the local TAL environment in this instance, but not to the preservation of TAL generally. The importance of TAL lies in both biological and cultural diversity, but this is not well recognized in Slovak legislation, as this falls under two separate legislative sectors – nature conservation and culture. Therefore, this study seeks to contribute to building up our knowledge base regarding the links between biological and cultural diversity and the implications of this for policy and decision making in the area of sustainable development.

The cultural landscapes can be seen as the result of hundreds of years of creation and sensitive cultivation of landscape structures respecting natural conditions (Krnáčová et al., 2013). Biodiversity studies have documented high biodiversity and occurrences of many rare and threatened species within the remnants of the semi-natural habitats in mosaics of TAL, but nature conservation is mostly oriented towards nature habitats. Here-with, we support a basic principle of modern nature protection: to preserve the greatest possible diversity of living systems, in order to preserve the maximum possible diversity of the conditions in which they live (Lieskovský et al., 2010). Considered in view of this principle and of the results of our research, improvement needs to be focused on the



preservation of these TAL types which are currently subjected only to minimal protection. The results of this TAL research form a valuable data source for further TAL assessment, specifically concerning their natural and cultural-historical value, and their future trends and threats. Evaluation of protective elements has created the basis for the elaboration of a strategy for preservation of this traditional agricultural landscape.

*(Translated by James Asher)*

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## **TRADICIONALNA KMETIJSKA POKRAJINA V VASI LIPTOVSKÁ TEPLIČKA NA SLOVAŠKEM: PREPOZNAVANJE IN VAROVANJE RAZNOVRSTNOSTI**

### **Povzetek**

Katastrska občina Liptovská Teplička na Slovaškem se razteza na 9869 ha južno od Nizkih Tater, na nadmorski višini od 846 do 1429 m. V upravnem smislu je del Prešovske regije in okrožja Poprad. Vas se prvič omenja leta 1634; prebivalstvo se je v preteklosti večinoma ukvarjalo s kmetijstvom, pretežno z govedorejo in gojenjem drobnice, gozdarstvom, splavarjenjem in strojenjem kož. V letu 2014 je v naselju živel 2373 prebivalcev: demografska (pozitivna demografska dinamika, priselitve povratnikov) in zaposlitvena (60 % je aktivnega prebivalstva) struktura sta ugodni. Na tem območju je tudi zelo zanimiva zemljiško-posestna struktura. Odločilni posegi kolektivizacije so ta del Slovaške predvsem zaradi manj ugodnih pogojev za intenzivno kmetijstvo večinoma zaobšli, zato je zanimiva za preučevanje kot tradicionalna kmetijska pokrajina (TKP), tj. kot kulturna pokrajina, v kateri so se ohranili zanimivi elementi soodvisnosti med naravo in človekom. Na preučevanem območju so tako prepoznali številne poteze TKP z mozaično kombinacijo obdelovalnih površin in travnikov; gozd pokriva 84 % celotnega ozemlja preučevane katastrske občine.

Tradicionalna kmetijska pokrajina izkazuje veliko pokrajinsko raznolikost, ki jo lahko prepoznamo v reliefnih oblikah, bogatih vodnih virih, vrstah prsti, vegetacijskih tipih ipd. (slike 1 in 2), kar predpostavlja odlično podlago za oblikovanje strategije varovanja narave. Ker je preučevano območje izjemno bogato tudi z vidika rastlinske in živalske biodiverzitete, na to območje z zaščitnimi ukrepi posegajo tudi mednarodne in državne regulative in direktive (npr. Kategorizacija zavarovanih območij, evropski direktivi o habitatih in pticah, Natura 2000 ipd.).

Rezultati študije, ki se osredotoča na prepoznavanje izjemno bogatih elementov raznolikosti tradicionalne kmetijske pokrajine ter rastlinske in živalske biodiverzitete, nakazujejo, da je obstoječa strategija varovanja narave ter zaščite naravnih, kulturnih in zgodovinskih virov usmerjena predvsem v varovanje naravnih habitatov. Avtorici poudarjata, da se je v prihodnosti potrebno usmeriti k zaščiti vseh tipov tradicionalne kmetijske pokrajine, ki so v katastrski občini Liptovská Teplička zaenkrat zaščiteni le v najmanjši možni meri.

*(Iz angleščine prevedla I. Potočnik Slavič)*