

METHODS OF HISTORICAL LANDSCAPE STRUCTURES IDENTIFICATION AND IMPLEMENTATION INTO LANDSCAPE STUDIES

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Abstract

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Valuable historical rural landscapes are found in the sub-mountainous and mountainous regions of the Carpathian Mountains in Slovakia. Authors contributed to the research about historical landscape structures (HLS) by several methods. Method of ‘identification and assessment of characteristic landscape’ was developed in order to provide maintenance to about HLS and improve application of responsibilities resulting from the European Landscape Convention (Florence, 2000) into practice of landscape planning. We bring a new perspective on landscape’s value identification in the field of landscape ecology. The main aim of the paper is identification of HLS as components of land cover structures in the cadastral area of Budina (agrarian terraces) and as micro-relief forms in Nižná Boca (mines). Studied areas represent two different rural landscape types which contain different values related to HLS and they are not especially protected by laws. We evaluate attributes of relief, visual-optometric parameters of landscape, landscape types, land cover structures and types of HLS. Maintenance about HLS in landscape is important for the preservation of unique types of cultural landscapes. Finally, we compare realisations of the visions, suggested in previous landscape studies, which concentrated on development of tourism in the studied areas.

Key words: historical structures, land cover, micro-relief forms, landscape types, values, landscape studies.

Significance and value of historical landscape structures in landscape types

Slovakia has a markedly rural character and according to the ‘National strategy of the rural development of the SR for the years 2007–2013’, rural areas cover 86% of the country and 40% of all inhabitants living there (Ministry of Agriculture of the SR, 2012). Valuable historical rural landscapes with historical landscape structures (HLS) are situated mainly in the Carpathian Mountains in the sub-mountainous and mountainous regions in Slovakia (EEA, 2010). We studied relics of traditional agricultural terraces in case of Budiná cadastral area, and in the second case, we studied mediaeval mines in Nižná Boca. The main goal of the paper is identification of HLS in different rural landscape types, assessment of their value and suggestion of recommendations for future management. In both cadastral areas, the value of

HLS was unknown and we tried to promote their significance for the development of tourism in landscape studies (elaborated before several years).

The latest trends in landscape research of land cover structures transformations correspond with findings of mapping and monitoring programmes of land cover in Pan-European programme Corine land cover (CLC) 2006. Changes which are indicated in land cover structures mean the end of very valuable areas with non-intensive agriculture (Olah, 2009). Land-accounts made by European Environment Agency (EEA) (1990–2000) show that except in some countries (Spain, France, Greece) afforestation trends prevail and extension of forests is often creating homogeneous land cover and landscape diversity is reduced (Agnoletti, 2008). Landscape typology plays a very important role in the assessment of landscape values. According to the European typology (Mücher et al., 2006), there appear 87 landscape types in Slovakia (the country occupies 49 035 km²). A comparison with the whole European area, where there are 375 types (10 396 619 km² and Slovakia spreads on 0.5% of the area), indicates relative high diversity of landscapes in Slovakia. There exist large number of landscape typologies reflecting cultural landscapes and HLS in Europe (Lipský, Romportl, 2007; Marusič, Ogrin, 1998; Pinto-Correia et al., 2003), and axiological attributes of landscape are extensively discussed topics in today's European landscape ecological research (Stephenson, 2008). Slovakia is also working on national typology of cultural landscapes where HLS indicate cultural landscape type and its quality (Oťahel' et al., 2008). HLS are part of cultural heritage and non-detachable parts of land cover structures (Huba, 2004). They contain huge information package and help us in clarifying the cultural landscape of the past and in understanding contemporary situation and refer to landscape genesis and history (Žigrai, 2000). One, but not the only, reason of typology elaboration is affiliation of the European Landscape Convention ELC (Florence, 2000) (Council of Europe, 2011) by Slovak Republic in 2005. Several conventions, for instance Agenda 21 in section II, capitol 10 (Rio de Janero, 1992) (The Rio Declaration, 1992), declare preservation of cultural heritage as integrated landscape value, but emphasis is given mostly to outstanding landscapes. Legal preservation of heritage values in non-protected landscapes is important to avoid degradation of cultural landscapes and damage of cultural and natural values protected by law (Bloemers et al., 2011). ELC is the first international treaty which involves maintenance and preservation of all types of landscape, non-conservative preservation of characteristic features in landscape types and definition of final landscape quality with public co-operation. Contemporary planners use wider definition of landscape heritage, which includes tangible or intangible elements that demonstrate the particular relationship a human community has established with a territory over time (Pungetti, Kruse, 2010). The most important law that concentrates on HLS and characteristic features preservation in Slovakia is the Act of National Council of the Slovak Republic No. 543/2002 Coll. According to the act, we can preserve 'characteristic landscape appearance' and 'significant elements of the landscape'.

Representative localities with agrarian and mining historical landscape structures

Cadastral area of Budina (633 m a.s.l.) (18.83 km²) spreads in neovolcanic Ostrôžky mountains and the village has very specific position around the distribution board between Tuhársky and Budinský potok streams. It has a cold climate with wet summers. Lower parts of the valleys are

narrow with steep slopes and forests, and the historical agricultural landscape is situated on the plains of uplands. The village was founded in 1393 and Wallachian colonisation affected the whole studied area during the 14th–16th century. Strong withdrawal of local inhabitants in the fifties and land consolidation processes caused decrease of valuable agricultural forms. The cadastral area of Nižná Boca (851 m a.s.l.) (25.18 km²) is situated in the Nízke Tatry Mt., in the valley of in the flat of the valley of Boca potok stream, which represents a very important tectonic fault of the Wester Carpathain Mt. It is built by crystalline and metamorphic rocks. Clime on highlands is very cold, not suitable for permanent growing crops. The village was founded in 1285. Mining activities were seasonal in the beginning and then German colonisation (Saxons) gradually affected the area for six centuries (14th–19th).

Method of ‘identification and assessment of characteristic landscape appearance’

Method of ‘identification and assessment of characteristic landscape appearance’ (Jančura et al., 2010) has officially been adopted by the Slovak Ministry of the Environment as a tool for practical landscape planning and it was developed at the Department of Landscape Planning and Design at Technical University in Zvolen in co-operation with Slovak Environmental Agency in Banská Bystrica. The Method helps us to provide arguments for HLS preservation in landscapes where existing laws provide insufficient protection. The Method contains steps of quantitative geo-data processing and landscape’s attributes evaluation in GIS as well as steps for axiological attributes assessment. Visualisation tools are used for documentation of real landscape appearance. Very important are archive and field researches. We developed a simple catalogue (Slámová, Beláček, 2004) for identification of HLS relief forms in terrain. Micro-relief forms have been persisted for many centuries in landscape and indicate ancient human activities. The results presented in the paper are derived from relative small areas (16 km²), but they correspond with outcomes of previous landscape studies elaborated in larger areas. We mostly used geo-data provided under the rules of Open Geospatial Consortium (OGC) available on Google earth and web map servers (WMS) (quoted in figures). Aerial survey photographs (Budina) (with resolution 0.2 m) are provided by TU – Zvolen in frame of the project CEX ITMS 26220120069. Results are ordered in frame of the methodical steps:

1. Optometric parameters for evaluating visual landscape appearance include spatial parameters about dimensions of the valleys; spatial characteristics of visual dominants; spatial characteristics of points for photo-documentation of landscape’s appearance (2012 Budina, 2002 Nižná Boca).
2. We identified HLS in landscape types. Landscape types prevailing in the studied area are represented by statistically significant combinations (more than 20%) of land forms and land use categories. Landscape types are evaluated in the grid 1 x 1 km². Land forms are classified according to absolute values of vertical division of terrain (Mičian, Zatkalik, 1986) and we used following categories lower uplands 111–180 m; uplands 181–310 m; highlands 311–470 m. Land cover is adapted CLC 2006 maps (1: 100 000). Land cover categories which we classified in large scale map (1:10 000), we identified in aerial survey photographs using classification according to Slámová et al. (2008). Land cover heterogeneity we classified according to patch density (Kunz, 2010) and we differentiate categories:

less than 5: very low; 6–10: low; 11–15: medium; 16–20: high; more than 20: very high. We evaluated size of land cover polygons and classified into following categories: macro-structures: >50ha, meso-structures: 49–10, micro-structures <10 ha. All types of HLS are classified at national level (Miklós et al., 2006). Agrarian HLS are classified at local level according to the ÚKE SAV typology (Špulerová et al., 2009). We compared contemporary agricultural plots (2010) and historical agricultural plots (1949) in the representative cell (Jakubec, 2011), in the Budina cadastral area. Mining HLS are classified at local level according to the material of State Geological Institution of Dionýz Štúr (ŠGÚDŠ) provided under the OGC rules available on WMS. Micro-relief forms of HLS were identified in the field and classified according to the catalogue (Slámová, Beláček, 2004).

3. We assess characteristic features and landscape values at European, national and regional levels. Criterion for evaluation are originality, age, scarcity, visual harmony with environment and identity of local inhabitants to landscape. We evaluated significant biotopes because often they are related to HLS, mainly to agrarian types. They are characterised according to the Daphne catalogue (Stanová et al., 2002). Genesis and types of historical mining forms were studied in archive materials of Central State Mining archive in Banská Štiavnica (2001) and Geofond ŠGÚDŠ, Bratislava (2003).
4. We determinate risk of landscape values degradation in the studied areas. Recommendations for spatial planning are described in part of the discussion and conclusions.

Results

The studied area of Budina has typical open panorama views (120°–180°) with visibility more than 10 km. Visual dominant of the space is Jasenie Mt. (771 m a.s.l.), the average distance between the distributing boards of the stream Tuharský potok is 1.4 km and Budinsky potok 1.9 km and elevation from the valley's bottom (350 m a.s.l.) to the mountain plains (650 m a.s.l.) is about 300 m. Typical are lower uplands (56%) and uplands (38%). We identified 28 polygons in six categories of CLC 2006. Area average is 57.1 ha, typical are macro-structures of the prevailing category: 21 – agricultural areas, heterogeneous agricultural areas, land principally occupied by agriculture with significant forms of non-wooden vegetation on an area of 606.88 ha (38%). Forests and semi-natural areas, forests, broad-leaved forests (code 23) (569.4 ha; 36%) are fragmented in landscape (represent 10 polygons). Landscape type that prevails in 31% of the studied area is represented by a combination of land cover structures 21 and 23 on lower uplands and uplands in grid cells: A1, B1, C1, D1, D2, A3, D3, A4, B4, C4, D4 (Fig. 1).

HLS classified at national level appear only in small, non-significant part of the cadastral area and are defined as meadow-grazing type. Agrarian HLS classified at local level are defined as: HLS with scattered settlements and permanent grasslands (code 102 with nos. 1, 2, 3, 4, 5, 6, 7, 12, 13, 14, 15, 16); HLS with arable land, meadows and pastures (code 404 with nos. 8, 9, 10, 11). Agricultural landscape (codes 12, 18, 21) in CLC 2006 spreads totally on an area 917.67 ha (57%) and agrarian HLS cover a relatively larger area: 215.18 ha (23%). Most are concentrated in the square C2 (44.76 ha) and B2 (35.63 ha). We identified a low level of heterogeneity in the map of CLC 2006 but in the aerial survey photographs there is visible diversity of land cover components in prevailing structure with code 21. Consequently, we classified land cover

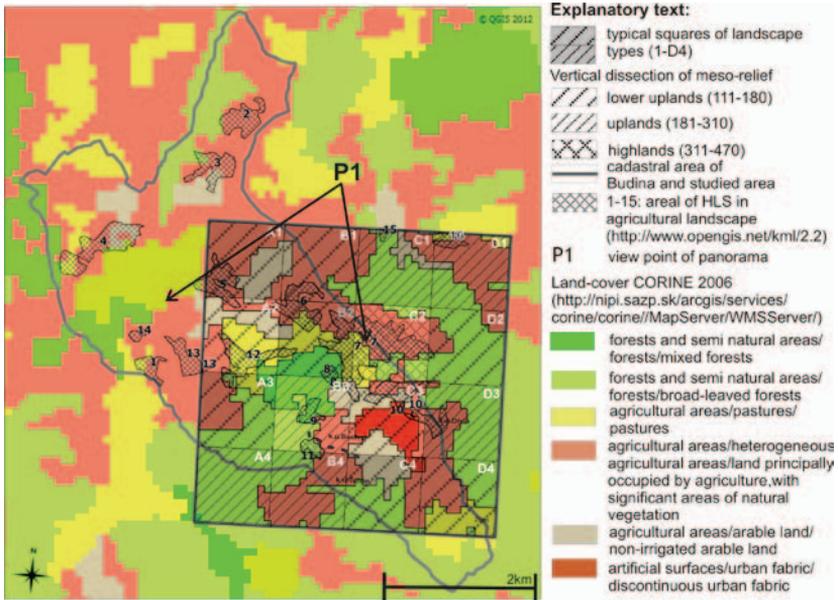


Fig. 1. Landscape types with HLS – agricultural terraces in cadastral area Budiné in Ostržky Mt.

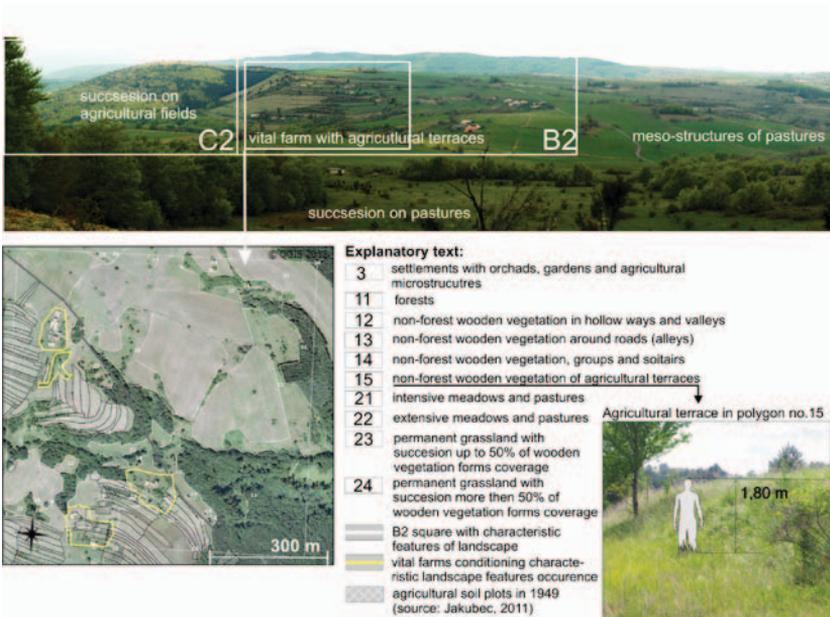


Fig. 2. Characteristic features and risk of values degradation (natural succession and meso-structures of pastures and meadows). Square B2 with historical plots and vital farms.

in scale 1:10 000 in representative square B2. We identified 43 units in square of 100 ha and the most numerous are formations of non-wooden vegetation forms (31 polygons) with dissected boundaries of polygons.

Vital farms are highlighted because they are necessary for the existence of agrarian HLS which support diversity of landscape components. For comparison, in 1949, in the same area, there existed 90 plots with a coverage of 13.2 ha, and in 2010 the coverage area decreased to 3.8 ha and average area of plots was very small (1.26 ha) and unsuitable for effective agriculture (Fig. 2). NATURA biotopes *Arrhenatherion elatioris* (Lk1), which have the European significance, spread on agrarian types of HLS and they are used as meadows mowed 2 times per a year (). Association *Calthion* (Lk5) spread on wet meadows. They are still visible in landscape and appear as characteristic landscape features but in many localities we can see strong succession processes that indicate transformation of landscape type. It means destruction of significant biotopes and extinction of preserved species. We are losing forever a part of the valuable cultural landscape. There is a necessity to provide job opportunities for local people in landscape and to take care of agrarian HLS (mowing and grazing) mostly in areas where vital farms exist and where revitalisation of landscape seems to be real.

Nižná Boca cadastral area is situated in the deep valley, inside mountains with glacial-holnis meso-relief forms and ridges with an altitude 1500-2000 m a.s.l. There are typical closed views (60°-90°) on landscape to a distance of about 5 km. Surrounding mountains create vertical dimension of the space and there are several visual dominants (Olešková 1166 m a.s.l.; Špigľové Mt. Ridge 1281 m a.s.l.; Fišiarica 1478 m a.s.l.; Rovná hoľa 1723 m a.s.l.; Chopec 1548 m a.s.l.; Červená 1202 m a.s.l.). The average of space width is 5.9 km, length is 4.5 km and elevation from the valley bottom to mountain ridges is 900 m. Prevail uplands (62.5%) and highlands (37.5%). We evaluated 14 polygons in five categories of CLC 2006 and the area average is 114.4 ha. Typical are macro-structures of coniferous forests (code 24) with total coverage of 1131.1 ha (70.7 %) and heterogeneity is low. Characteristic landscape type consists of combination coniferous forests on highlands which spread on 900 ha (56.25%) of the studied area in squares: A1, C1, D1, D2, A3, A4-D4 (Fig. 3).

On the example of Boca, we document the importance of detailed archive and field research. According to classification of HLS at national level, there occur meadow-grazing type but historical mining type is not registered. Mines were identified at local level according to data provided by archive (Geofond of old mines) of the State Geological Institute of Dionýz Štúr. Mines occur mostly in squares: B4, C4, B3 (300 ha) in historical mining field Zach, under the Fišiarica Mt. (Figs. 4 and 5). Heaps of alluvial golden deposits occur in C1; in square B4 there are 48 mining works: 3 shafts, 31 tunnels, 3 heaps, 5 objects with excavated substrate and 6 sink holes; C4: 7 sink holes, 9 heaps, 5 tunnels, 2 shafts; B3: 25 tunnels, 44 heaps, 4 prospector works, 6 sink holes and one shaft. In the previous landscape study, we observed that Nižná Boca was one of the 211 cadastral areas with historic mines (10% of all cadastral areas of Slovakia) and this area was well known in the 15th–16th century due to gold mines yield as ‘the second Banská Štiavnica’ (Slámová et al. 2003).

Historic mining activity is reflected by numerous mining relief forms in the forests. Heaps are relatively small, they reach about 2-3 m in height, because of using primitive manual technologies in mines and it makes this locality unique. Only few of these objects are visible in the landscape's appearance (Fig. 5). We observed also small agricultural terraces on the slopes around village. They are specific because document short agricultural historical period in mostly mining history of landscape. Agricultural activity was not effective for live out because

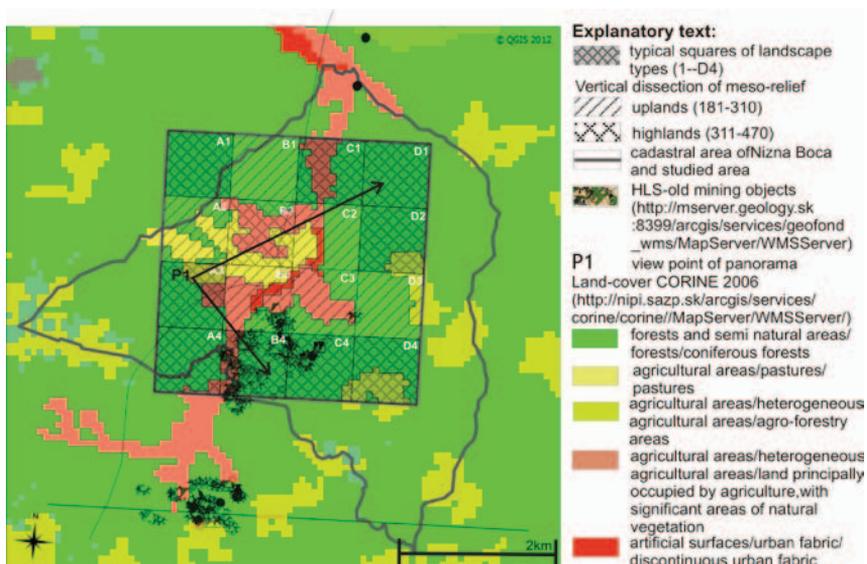


Fig. 3. Landscape types with HLS – mining objects in cadastral area Nižná Boca in Nízke Tatry Mt.

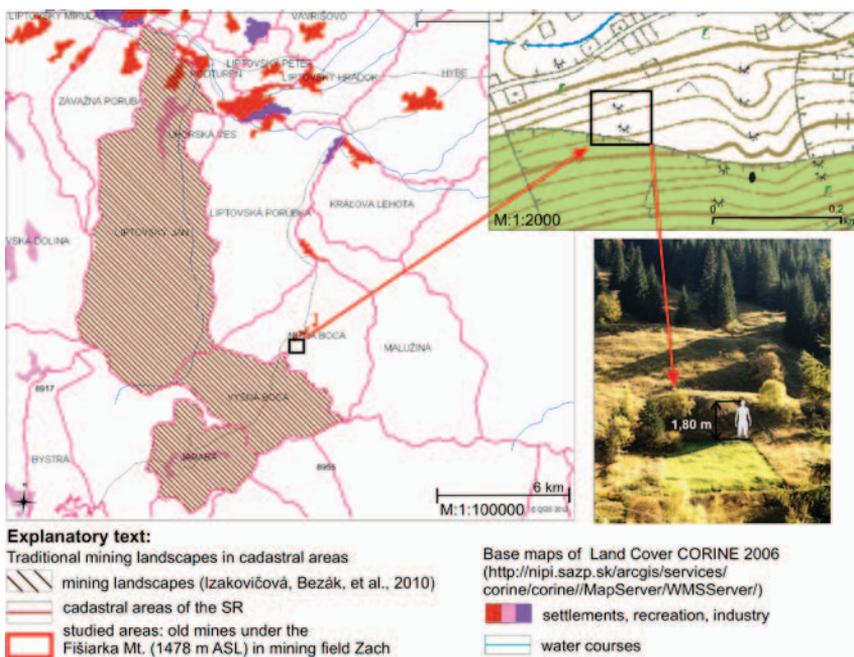


Fig. 4. Identification of mining HLS at regional and local levels (Nižná Boca in Nízke Tatry Mt).

of the harsh natural conditions. Landscape values complement typical double-spaced mining houses and Carpathian rustic houses in the village and rustic lofts on the pastures and meadows which document Wallachian colonisation. The studied area is a part of National park Nízke Tatry which corresponds in main part with two NATURA 2000 protected areas (SKUEV0310, SKUEV0302). Historical mowed meadows and pastures are covered by NATURA biotopes of assoc. *Polygono-Trisetion* on active mowed meadows (Lk2). Characteristic landscape appearance is mostly endangered by destruction of architecture, succession processes on the traditional pastures. Mining HLS are not directly endangered, but it is necessary to promote them in public sector.

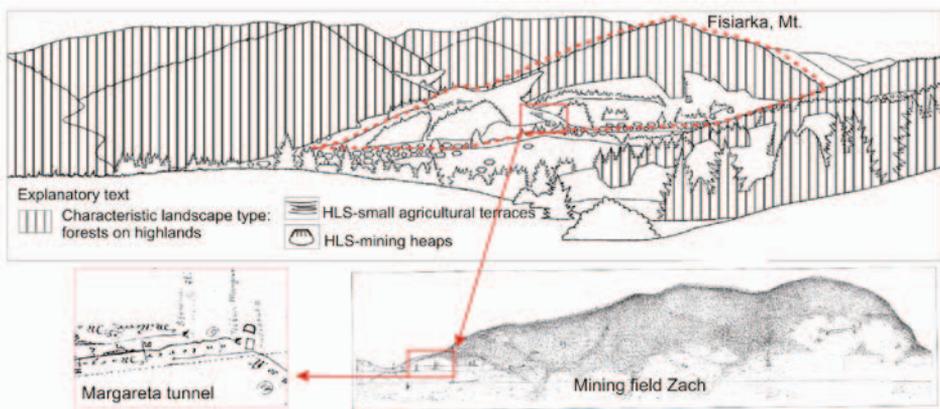


Fig. 5. Characteristic features – relief forms of mining heaps and small agricultural terraces in Nižná Boca (drawn panorama) and comparison with veduta of the historical mining field ‘Zach’.

Discussion and conclusion

Budina is a member of the micro-region Javor. The Department of Landscape Planning and Design elaborated landscape-ecological study in 2006 where is presented large spectrum of opportunities for tourism development of the region. We provided more intensive promotion to Budiná and then to Nižná Boca, but unfortunately recommendations were not successfully implemented into practice. Infrastructure in the region is insufficient for tourism activities and till today no other services have started. Heterogeneous agricultural landscape, semi-natural agricultural landscape with inner high level of heterogeneity supported by variety of non-forest woody vegetation forms, which tourists admire, has been changing into homogeneous forests. Similar negative transformations are observed also in other regions with valuable HLS in Slovakia (Daniš, 2008) and in a few years, landscapes will lose their specific character. Diversity of land cover structures and their components are two significant indicators in landscape quality assessment (Tveit et al., 2006) and knowledge about historical genesis of agricultural landscape is necessary for understanding habitat distribution and fragmentation in contemporary agricultural landscape (Lunt, Spooner, 2005). Diversity of natural conditions, contiguity to Panonian regions and historic human activities correlate significantly with diversity of biotopes and it is the reason why agrarian terraces are very important for further biodiversity preservation

in this specific region of the Ostrôžky Mt. (Urban, 1999). Biotopes on the active mowed and grazed HLS in Budina are protected as NATURA 2000 areas. Generally, agrarian HLS support landscape diversity and biodiversity and developed typology of HLS by ÚKE SAV in Slovakia can help us to preserve significant biotopes in agricultural landscapes in the practice of landscape planning. A solution can be seen in multi-functionality of the rural landscape (Wilson, 2007) where besides productive activities (agriculture, forestry) other services will work, as it is stated also in National strategy of the rural development of the SR for the years 2007-2013.

Nižná Boca is continuing tourism expansion in frame of our case study and municipality is working on the project Slovak Mining Road (Golden Boca Road) (Nižná Boca, 2012) with a vision of becoming a part of the European mining road. Agrarian HLS support biodiversity in agricultural landscapes and contribute to ecological value of landscape. On the other side valuable mining objects which have persisted as micro-relief forms in homogeneous macrostructures of the forests, have no relations to the landscape diversity and biodiversity. Biodiversity is only one of the several criterion used for assessment of landscape value. Legislation should provide protection to all types of HLS, because besides natural value and heritage there are important also cultural and historical values, as we document in the results. HLS could be preserved as 'significant landscape elements' or as features in 'characteristic landscape appearance', but we would like to mention that preservation of 'significant landscape element' and 'characteristic landscape appearance' according to law no. 543/2002 Coll. is hard to enforce in practice of landscape planning, because both terms have insufficient and too vague definitions.

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References

- Agnoletti, M. (2008). European Agricultural Policies and Landscape: Effects Strategies and Perspectives. In *Proceedings of the 7th Meeting of the Council of the Europe of the Workshops for the Implementation of the European Landscape Convention* (pp. 11–22). Piešťany.
- Bloemers, T., Kars, H. & Van der Valk A. (2011). *The Cultural Landscape and Heritage Paradox: Protection and Development of the Dutch Archaeological-Historical Landscape and its European Dimension*. Amsterdam: University Press.
- Council of Europe (2011). *The European Landscape Convention* [online]. Source. Available from: <http://www.coe.int/t/dg4/cultureheritage/heritage/Landscape> [Accessed 8 August 2011].
- Daniš, D. (2008). *Prognosis of Succession Processes Dynamics and its Influence on Pieniny National Park Landscape..* Poniky: Partner.
- EEA (2010). *Foresight Analysis of Rural Areas of Europe, 2007–2010, EEA report, 2010* [online]. Source. Available from: <http://www.eea.europa.eu/publications> [Accessed 10 June 2012].
- Huba, M. (2004). Historical Landscape Structures in Context of Contemporary Reality (in Slovak). *Životné prostredie*, 38, 86–89.
- Jakubec, B. (2011). *Influence of Land Use with Dispersed Settlements on Landscape's Diversity and Biodiversity*. PhD thesis, Technická univerzita, Zvolen.
- Jančura, P., Boháľová, I., Slámová, M. & Mišíková P. (2010). Method of Identification and Assessment of Characteristic Landscape Appearance. In *Bulletin of the Ministry of Environment of Slovak Republic*, Part 1b, 18, 2–51. Bratislava: MŽP SR.

- Kunz, M. (2010). Diversity of the Spatial Landscape Structure in the Region of Pomerania Presented with Remote Sensing and Cartographic Methods. In R. Reuter (Ed.), *Remote Sensing for Science, Education, Natural and Cultural Heritage* (pp. 553-559). EARSeL Press.
- Lipský, Z. & Romportl D. (2007). Classification and Typology of Cultural Landscapes: Methods and Applications. In K. Ostaszewska et al. (Eds.), *The Role of Landscape Studies for Sustainable Development* (pp. 519-535). Warsaw: University of Warsaw.
- Lunt I.D. & Spooner, P.G. (2005). Using Historical Ecology to Understand Patterns of Biodiversity in Fragmented Agricultural Landscapes. *J. Biogeogr.*, 32, 1859-1873. DOI: 10.1111/j.1365-2699.2005.01296.x.
- Marusič, D. & Ogrin D. (1998). *Methodological Bases, Regional distribution of Landscape Types in Slovenia*. Ljubljana: MEFP.
- Mičian, L. & Zatkalič F. (1986). *Landscape's Theory and Maintenance about Environment (in Slovak)*. Bratislava: UK.
- Miklós, L. & Izakovičová Z. (Eds.), (2006). *Geo-ecosystems of Slovakia (in Slovak)*. Bratislava: ÚKE SAV.
- Ministry of Agriculture of the Slovak Republic. *Rural Development Programme of the Slovak Republic 2007-2013* [online]. Source. Available from: <http://www.mpsr.sk/en/download.php?fID=81> [Accessed 20 August 2012].
- Mücher, C.A., Wascher, D.M., Klijn J.A., Koomen, A.J.M. & Jongman R.H.G. (2006). A new European Landscape Map as an Integrative Framework for Landscape Character Assessment. In R.G.H. Bunceand (Eds.), *Proceedings of the European IALE Conference 2005 in Faro, Portugal*. IALE Publication Series, 3, 233-243.
- Nižná Boca (2012). *Slovak Mining Road* [online]. Source. Available from: <http://www.slovenskabanskacesta.sk/lokality.htm> [Accessed 10 June 2012]
- Olah, B. (2009). Transformation of the Slovak Cultural Landscape since the 18th century and it recent trends. *Journal of Landscape Ecology*, 2, 41-55.
- Oťahel, J., Hrnčiarová, T. & Kozová M. (2008). Landscape Typology of Slovakia, Landscape Regionalization of its Natural-cultural Character. *Životné prostredie*, 42, 70-76.
- Pinto-Correia, T., Canela d'Abreu, A. & Oliveira R. (2003). Landscape Evaluation: Methodical Consideration and Application within the Portuguese National Landscape Assessment. In J. Brandt & H. Vejre (Eds), *Multifunctional Landscapes, Vol. 1: Theory, Values and History, Advances in Ecological Sciences*. Southampton: WIT Press.
- Pungetti, A. & Kruse A. (2010). *European Culture Expressed in Agricultural Landscapes. Perspectives from Eucaland Project*. Roma: Palombi Editori.
- Slámová, M., Jančura, P. & Beláček B. (2003). Mining as Phenomena of Nižná Boca. In *Landscape's Memory. Kształtowanie Krajobrazu Terenow Poeksploatacyjnych w Gornictwie* (pp. 54-61). Kraków.
- Slámová, M. & Beláček B. (2004). Typology of Relief Forms of Historical Landscape's Structures (in Slovak). In P. Jančura (Eds.), *Historical Landscape's Structures* (pp. 25-31). Banská Štiavnica: Partner.
- Slámová, M., Kuľanda, M. & Jančura P. (2008). Vanishing Phenomenon of Rural Landscapes in Slovakia (in Slovak). In J. Dreslerová (Eds.), *Proceedings, Rural Landscape 2008* (pp. 119-125). Brno: CZ-IALE.
- Stanová, V. & Valachovič M. (Eds.), (2002). *Catalogue of Biotopes in Slovakia (in Slovak)*. Bratislava: DAPHNE - Institute of Applied Ecology.
- Stephenson, J. (2008). The Cultural Values Model: An Integrated Approach to Values in Landscapes. *Landsc. Urban Plann.*, 84, 127-139. doi:10.1016/j.landurbplan.2007.07.003
- Špulerová, J. & Štefunková D. (Eds.), (2009). *Handbook for Mapping of Historical Structures of Agricultural Landscape (in Slovak)*. Bratislava.
- The Rio Declaration on Environment and Development (1992). [online]. Source. Available from: <http://habitat.igc.org/agenda21/> [Accessed 15 July 2011].
- Tveit, M., Ode, A. & Fry G. (2006). Key Concepts in a Framework for Analysing Visual Landscape Character. *Landscape Research*, 31, 229-256. DOI:10.1080/01426390600783269
- Urban, P. (1999). *Meeting of scientists in Ostrôžky, 1999 (in Slovak). Protected Areas in Slovakia*. [online]. Source. Available from: <http://www.sazp.sk/slovak/periodika/chus/42/page19.html> [Accessed 14 October 2011]
- Wilson, G.A. (2007). *Multifunctional Agriculture. A transition Theory Perspective*. Towbridge: Cromwell Press.
- Žigrai, F. (2000). Cultural landscape as reflection of relation between man and the landscape (in Slovak). In P. Jančura (Ed.), *Proceedings: Landscape, Man, Culture* (pp. 47-52). Banská Bystrica: SAŽP.