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Structural changes in the agricultural landscape and occurence of gene pool importance trees

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Abstract

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The content of this paper is assessment of the changes in the landscape structure in the cadastral area in Žirany as compared between 1869 and 2012. In the second part of this paper, the occurrence of gene pool trees identified within the cadastral area is presented.

Changes in the representation of landscape elements, their internal structure and surface-area spatial distribution of land is a reflection of property ownership relations, land use forms, especially forms of intensification in agriculture and socio-economic development of society. Landscape structure was evaluated from maps and field research of the current situation. The current landscape structure (CLS) in 2012 was evaluated using 9 groups and a total of 44 landscape elements. In assessing the historical landscape structure (HLS) from 1869, 8 groups and 19 basic landscape elements were used. The most significant changes in the secondary landscape structure between 1869 and 2012 were identified in the following elements in the compared time periods: a slight decrease in the portion of forest (from 42.83 to 40.76%), increase in the portion of non-forest woody vegetation (from 0.33 to 4.00%), reducing the share of agricultural used areas (from 44.16 to 37.86%), decrease of surface of grass-herb vegetation (from 10.17 to 5.99%) and increase of the built up areas (from 1.56 to 6.44%). A significant change is observed in the conversion of mosaic structure of narrow-band fields to large-block forms of agricultural land use. Attention was devoted on the spatial distribution of tree species and biodiversity in the group of non-forest woody vegetation (NFWV) during the mapping of the CLS features. In the formations of NFWV 6 species with important gene pool and above-standard biometry and age of trees have been identified with a total of 47 subjects within the land. These are the species: *Castanea sativa* Mill. (18 subjects) *Mespilus germanica* L. (1 subject), *Quercus cerris* L. (1 subject), *Q. dalechampii* Ten. (2 subjects), *Q. petraea* (Mattusch.) Liebl. (23 subjects), *Q. polycarpa* Shur. (2 subjects). Genetically significant trees were also localized by GPS.

Keywords

agricultural landscape, land use changes, rare trees, secondary landscape structure

Introduction

Landscape structure is a reflection and a result of long-term human activities on the nature components and depends on form and intensity of land use and its natural resources. The original (natural) landscape changes into a secondary landscape structure are as a result of human activity (Ružička and Ružičková, 1973). In this category we can identify a subset of historical landscape structures, in which landscape elements represent their

existence and continuity for at least 50 years. Historical landscape structures (HLS) with links to important buildings of civilizations, transport systems and historical paths, but also on agricultural land use, for example terraced rice fields, vineyards, olive groves etc. are known in the world (Supuka et al., 2008). A complex description of the HLS of Slovakia and their categories according to forms of economic activity is mentioned by Huba et al. (1988).

Many publications are currently devoted to the study of the development of landscape structure changes over different compared periods. Pucherová (2004) presents the results of development and changes in landscape structure on example of five cadastral territories of Nitra region and compares the 2nd half of the 19th century (1863, 1879, 1892) to 2002. Categorization of historic landscape structures of agricultural land in Slovakia was published by Špulerová et al. (2011), according to the categories of crops and ground cover. Petrovič (2006) in his publication deals with development of the landscape in the area of dispersed settlements on the example of Pohronský Inovec and Tribeča. Hreško and Guldanová (2012) analysed changes in secondary landscape structure on the example of protected areas and Bihuňová and Štěpánková (2012) evaluated changes in land use from point of rural tourism development.

Atlas of cultural landscape was prepared in Italy, where the decisive factor is the differential land use forms, features and value of cultural and historic landscape components (Agnoletti, 2011). Štefunková et al. (2011) dealt with development changes, biodiversity and cultural and historical values of the vineyard landscape in the region of Malé Karpaty. Vine-growing segment of the cultural landscape in Nitrianske Hrnčiarovce cadastre, its development and values was published by Supuka et al. (2011).

In research of development and changes in landscape structure of studied area, biodiversity including cultural biodiversity and gene pool valuable trees is often inventoried. Supuka (2010) states that in the landscape of Slovakia, formations of non-forest woody vegetation represent an area of 60,000 ha, of which 6,000 ha are planted wind-breaks. There is 15 to 30 species of trees identified at wind-breaks, in many cases, gene pool very rare. Commemorative trees of point, group or alley character represent 466 sites in Slovakia and 167 species of gene pool rare trees. In Czech Republic in area of study, Olomouc region, 95 features of on-road tree alleys with high species diversity were mapped. These mainly have the gene pool value, as many natural landmarks (Esterka et al., 2010). Criteria for designating protected trees have been developed in the Slovak legislation as part of Law of nature and landscape protection (No. 543/2002 Z. z.) (Krištof, 1999). In the list there is listed 110 species of trees and for each species are defined minimal criteria of age (at least 100 years) and girth stem 130 cm above ground (for trees at least 150 cm). Trees represent an important landscape dominants, as well as significant historic and landscape-forming element (Kupka, 2010).

The aim of this paper is to evaluate the developmental changes in secondary landscape structure in the cadastral territory of Žirany compared in two time periods, and between 1869 and 2012. Emphasis is laid on elements of non-forest woody vegetation and preserved structures of crops (orchards, vineyards and forest remains), where gene pool rare tree species with potential for their conservation and cultural value were evaluated.

Material and methods

Within the mapping of the secondary landscape structure (SLS) we started from the publication of Ružička and Ružičková (1973). From the original classification of 6 groups of elements of SLS after the modification and refinement (Pucherová, 2004), we used 9-group-classification of landscape elements in the current landscape structure (CLS) (Table 1). The total number of evaluated landscape elements in CLS in the evaluated area was 44. The basis of this evaluation was the field mapping CLS, which was conducted in the days 17 August 2011, 27 September 2011 and 12 June 2012. When creating a digital model of CLS we used 4 map sheets of basic maps at scale 1:10,000, issued by the Office of geodesy, cartography and cadastre of the Slovak Republic, as a base. To refine the presence of the selected landscape elements we used orthophotos (Orthophotomap © Geodis Slovakia, ltd. 2003, aerial photo and digital orthophoto © Eurosense, ltd., 2003). Given that in 1869 the original map did not contain the group of technical elements, in the evaluation of the historical landscape structure (HLS) we used only the eight basic groups of 19 landscape features (Table 1). The HLS were processed on the basis of maps of 2nd military mapping in 1869. We created digital models of maps in two time periods in the SLS area of interest in GIS using ESRI ArcView 3.1 (Figs 1 and 2). These were used in assessing of the land use form changes in two time frames. In each time frame we evaluated the character, planar representation and share of individual landscape elements and their groups. Then both digital models on the level of individual groups of landscape elements were covered over each other. The result is a map of changes in the SLS in the cadastral territory Žirany between 1869 and 2012 (Fig. 3).

In mapping and assessment of elements of non-forest woody vegetation (NFWV), in addition to standard forms of mapping biodiversity of species of trees and their sociability in the spatial structure of NFWV, we paid attention especially to searching, identifying and assessing of old, oversized, and gene

pool important species. The mapping was carried out according to modified method (Krištof, 1999) with the measurement values such as tree height, crown width, trunk circumference of 130 cm above the ground and estimated age, with the addition of value allocation in the country using GPS devices, Garmin type of e-Trex Legend C. During mapping, we focused on the elements of historic landscape structures, and active and abandoned vineyards and orchards outside urban settlements, solitary in the country, permanent grassland and pastures with the presence of trees, road alleys in the country.

Table 1. Area representation and proportion of landscape elements in the historical and current landscape structure of cadastral area Žirany

Group of landscape elements	Landscape element of CLS[1]	CLS[1]		Landscape element of HLS[2]	HLS[2]	
		ha	%		ha	%
Forest woody vegetation	Continuous deciduous forest	608.18	39.17	Forests	665.01	42.83
	Continuous mixed forest	15.77	1.01			
	Young trees	3.28	0.21			
	Continuous intersections	5.72	0.37			
Sum:		**632.95**	**40.76**		**665.01**	**42.83**
Non-forest woody vegetation	Woods	1.65	0.11	Line woody vegetation	2.09	0.14
	Groups of trees	1.69	0.11			
	Line woody vegetation	10.07	0.65			
	Alleys	1.20	0.08			
	Planes of bushes with trees	15.14	0.98			
	Riparian stand of water streams	11.05	0.71			
	Heaths	3.84	0.24	Riparian stand of water streams	2.94	0.19
	Overgrown shrub-tree in mosaics	17.43	1.12			
Sum:		**62.07**	**4.00**		**5.03**	**0.33**
Grasslands	Pastures	29.69	1.91	Pastures	29.96	1.93
	Meadow	33.41	2.15			
	Extensive grasslands of succession type with low proportion of trees	17.08	1.10			
	Extensive grasslands of succession type with high proportion of trees	11.06	0.71	Meadow	128.01	8.24
	Planes of rattan with low proportion of ground wood	1.82	0.12			
Sum:		**93.06**	**5.99**		**157.97**	**10.17**
Agricultural areas	Large-block arable land	478.42	30.81	Narrow-striped fields	625.81	40.30
	Narrow-striped fields	50.25	3.24			
	Mosaic structures 1 – vineyards, narrow-striped fields, orchards	29.16	1.88	Mosaic structures – vineyards, narrow-striped fields, orchards, grasses	52.89	3.41
	Mosaic structures 2 – vineyards, narrow-striped fields, orchards, grasses	5.71	0.37			
	Intense, large-scale orchards	18.04	1.16	Plantations of fruit trees	7.07	0.45
	Extensive, small-scale orchards	6.18	0.40			
Sum:		**587.76**	**37.86**		**685.77**	**44.16**

Table 1. Area representation and proportion of landscape elements in the historical and current landscape structure of cadastral area Žirany – continued

Group of landscape elements	Landscape element of CLS[1]	CLS[1]		Landscape element of HLS[2]	HLS[2]	
		ha	%		ha	%
Rocks and bedrock substrate	Natural rock formations	0.15	0.01	Natural rock formations	3.60	0.23
	Stone-pits	16.48	1.06			
Sum:		**16.63**	**1.07**		**3.60**	**0.23**
Water stream	Dry ditch storms, intermittent streams	0.07	0.01	Natural water streams	2.07	0.13
	Water streams regulation, drainage channels	1.34	0.09			
Sum:		**1.41**	**0.10**		**2.07**	**0.13**
Built up areas	Built-up areas of rural houses and individual residential buildings outside urban area	21.03	1.35	Residential houses	7.03	0.45
				Residential farm buildings outside urban area	0.57	0.04
	Gardens	65.26	4.20	Farms and gardens	7.27	0.47
	Churches and cemeteries	1.72	0.11	Churches and cemeteries	1.77	0.11
	Schools, playgrounds, administrative and civic equipment	3.01	0.20	Public squares	7.64	0.49
	Settlement vegetation	8.96	0.58			
Sum:		**99.98**	**6.44**		**24.28**	**1.56**
Technical elements	Industrial production areas	8.94	0.58		0.00	0.00
	Agricultural production areas, farms, agricultural stores, reinforced dung-yards	7.32	0.47			
	Illegal waste dumps, unused areas	0.36	0.02			
	Used building and technical objects in the open country, areas of water management	0.36	0.02			
	Reinforced and handling areas	2.79	0.18			
Sum:		**19.77**	**1.27**		**0.00**	**0.00**
Traffic elements	Important main roads	1.75	0.11	Paved roads	1.45	0.09
	Side roads	1.57	0.10			
	Other roads	6.67	0.43	Other roads	7.57	0.49
	Local reinforced communications	3.74	0.24			
	Local non-reinforced communications	8.59	0.55			
	Railway lines, stations and slopes along the railway line	16.07	1.03	Bridges	0.08	0.01
	Bridges	0.81	0.05			
Sum:		**39.20**	**2.51**		**9.10**	**0.59**
		1,552.83	**100.00**		**1,552.83**	**100.00**

1 – CLS, Current landscape structure; 2 – HLS, Historical landscape structure.

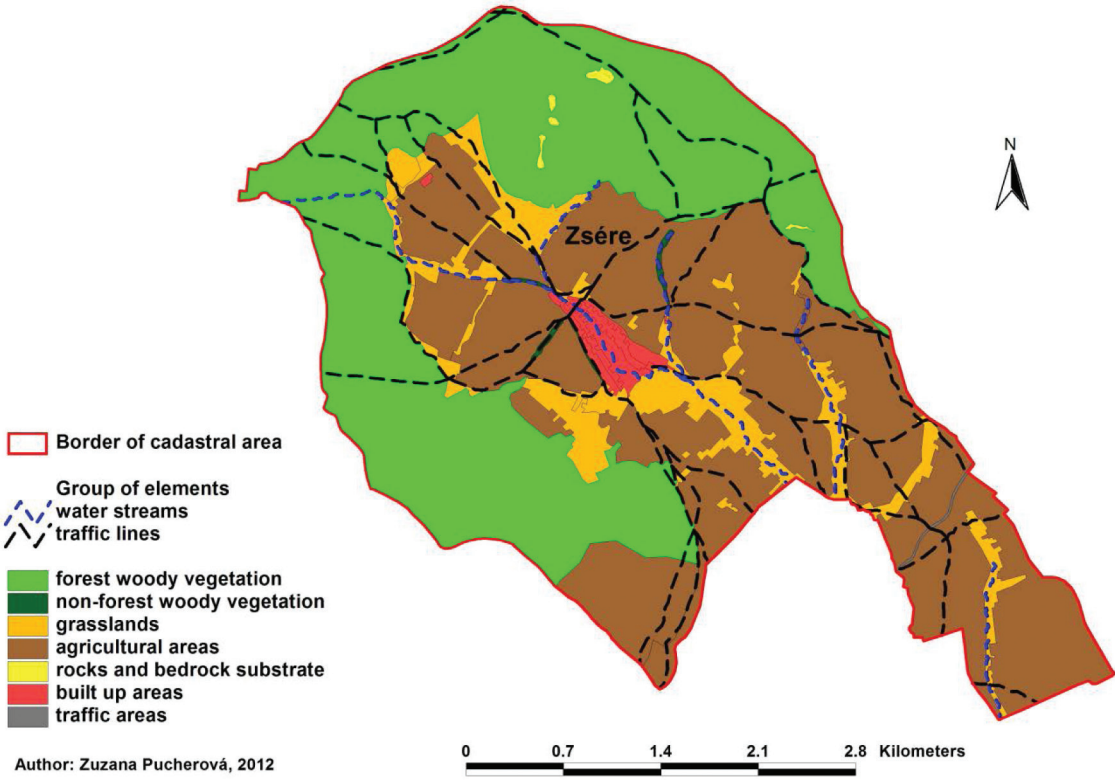

Fig. 1. Historical landscape structure of cadastral area Žirany in 1869.

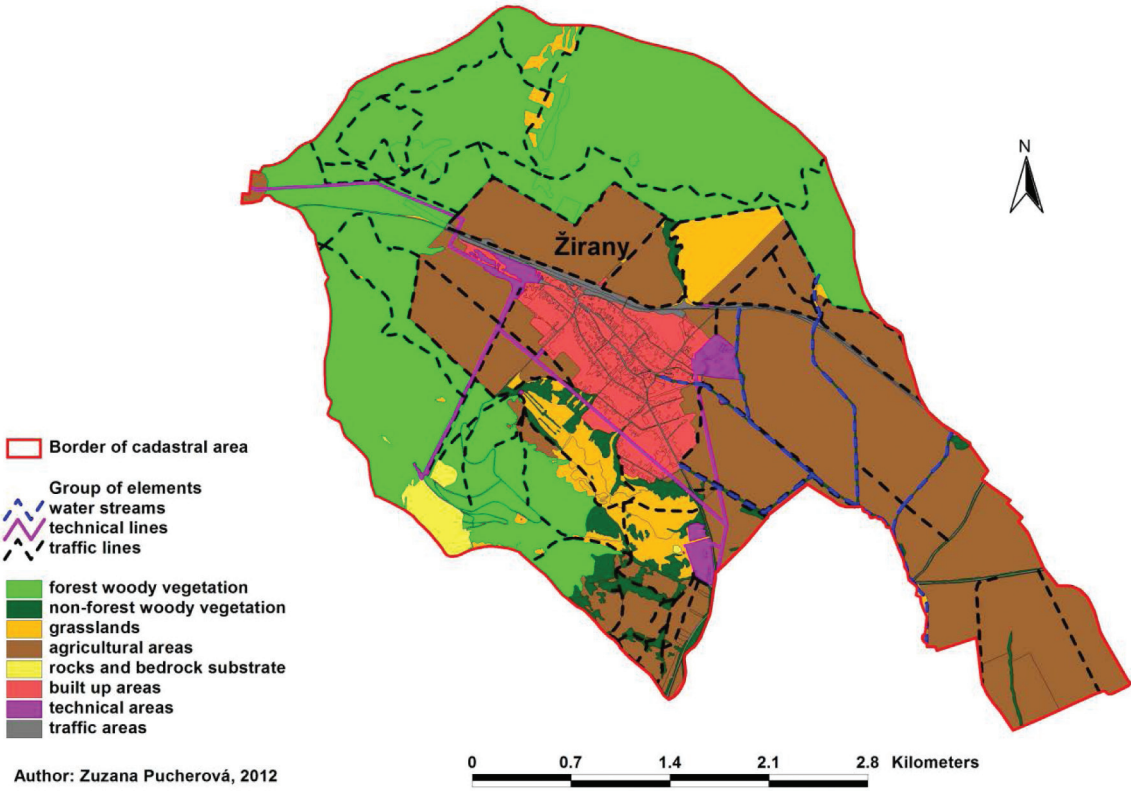

Fig. 2. Current landscape structure of cadastral area Žirany in 2012.

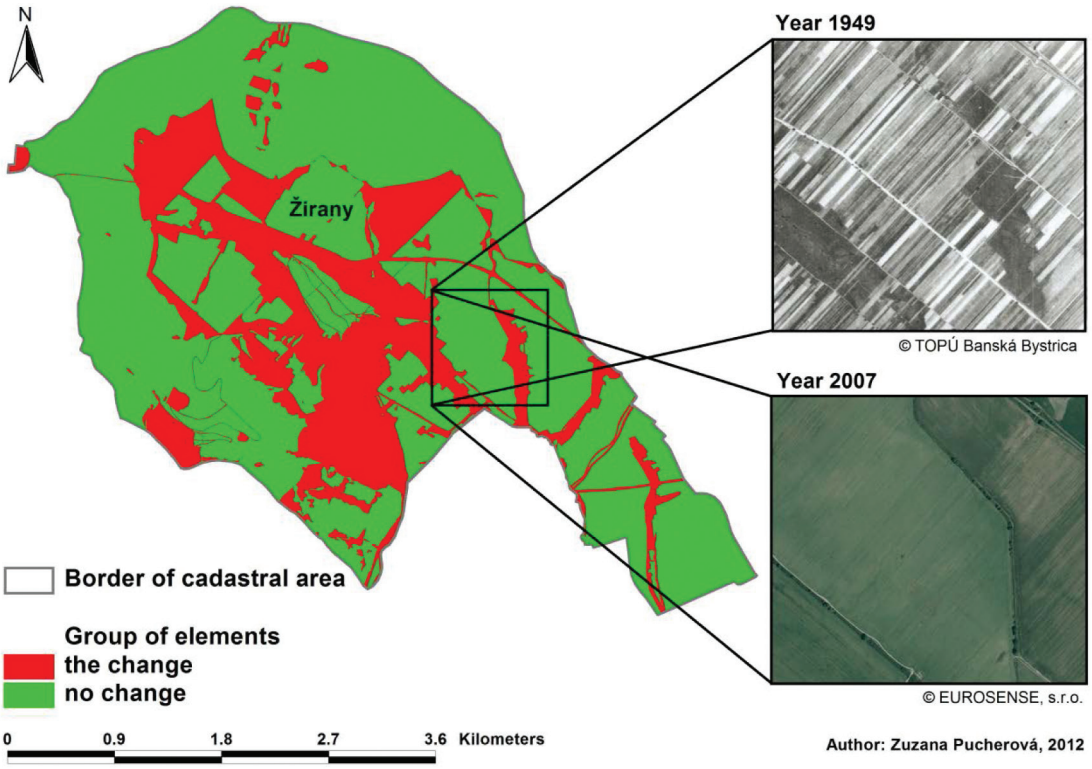

Fig. 3. Changes of secondary landscape structure of cadastral area Žirany since 1869 to 2012 and comparison of land use form changes since 1949 to 2007 at aerial photos.

Results

Of the total cadastral territory of Žirany (1,552.83 ha), landscape elements of forest woody vegetation (665.01 ha, 42.83%) and agricultural areas (685.77 ha, 44.16%) have the most representation in the HLS. Continuous forests line the south-western, northern and south-eastern part of the land in a shape of horseshoe. In the middle of this area are narrow-band fields that line the rivers along the meadows and pastures (157.97 ha, 10.17%) and cut off the large areas of narrow-striped fields. Landscape features of the other groups were represented at HLS only slightly (Table 1), even a group of technical elements is not located in evaluated area in HLS. A group of agricultural crops had form of complementary areas with mosaic structures of vineyards, narrow-band fields, fruit trees and orchards, crops and grass fields. These occur in the southern part of the land in continuous contact with the forest and form the basis of the current mosaic structure with a number of woody plants of gene pool importance.

Like in the HLS also in the CLS, landscape elements of the forest woody vegetation (632.95 ha, 40.76%) and agricultural areas (587.76 ha, 37.86%) are predominant. Built up elements are in an area of 99.98 ha (6.44%), thus we can conclude the growth of urban areas within the historical development. The occurrence of elements of NFWV (62.07 ha, 4.00%) plays an important role in the CLS, particularly in terms of eco stabilizing features in agricultural landscapes. Other elements of CLS occupy smaller areas (Table 1).

In the formations of NFWV 6 species with important gene pool and above-standard biometry and age of trees have been identified with a total of 47 subjects within the land (Table 2). These are the species: *Castanea sativa* Mill. (18 subjects) *Mespilus germanica* L. (1 subject), *Quercus cerris* L. (1 subject), *Q. dalechampii* Ten. (2 subjects), *Q. petraea* (Mattusch.) Liebl. (23 subjects), *Q. polycarpa* Shur. (2 subjects). The trees in the category of fruit species have been identified in particular areas of landscape elements belonging to the historic landscape structures such as abandoned or extensively managed orchards and vineyards. Native species of the genus *Quercus* sp. were identified in areas of extensive and abandoned grassland and permanent pasture. Measured biometric values (Table 2), as well as allocation of cadastral area (Fig. 4) are important data of gene pool significance and also as potential for protection of elements in the cultural landscape. The values of the identified individual chestnut trees with 700 cm girth stem of 1.3 m above the ground and an estimated age of 450 years

are remarkable. In the category of species of *Quercus* sp. are valuable rare species occurrences *Q. polycarpa* Shur. and *Q. dalechampii* Ten., as well as their biometric values and reached estimated age of 250 years. *Q. petraea* (Mattusch.) Liebl. represents the most valuable individual gene pool importance of data as 400 cm girth and estimated age of 300 years. Identified oversized trees have a particular historical, cultural and gene pool values. Implementation of the chestnut culture in this land is probably related to nearby locations in chestnut grove Jelenec (Gýmeš), where according to literature were the first planting carried out in the 13th century.

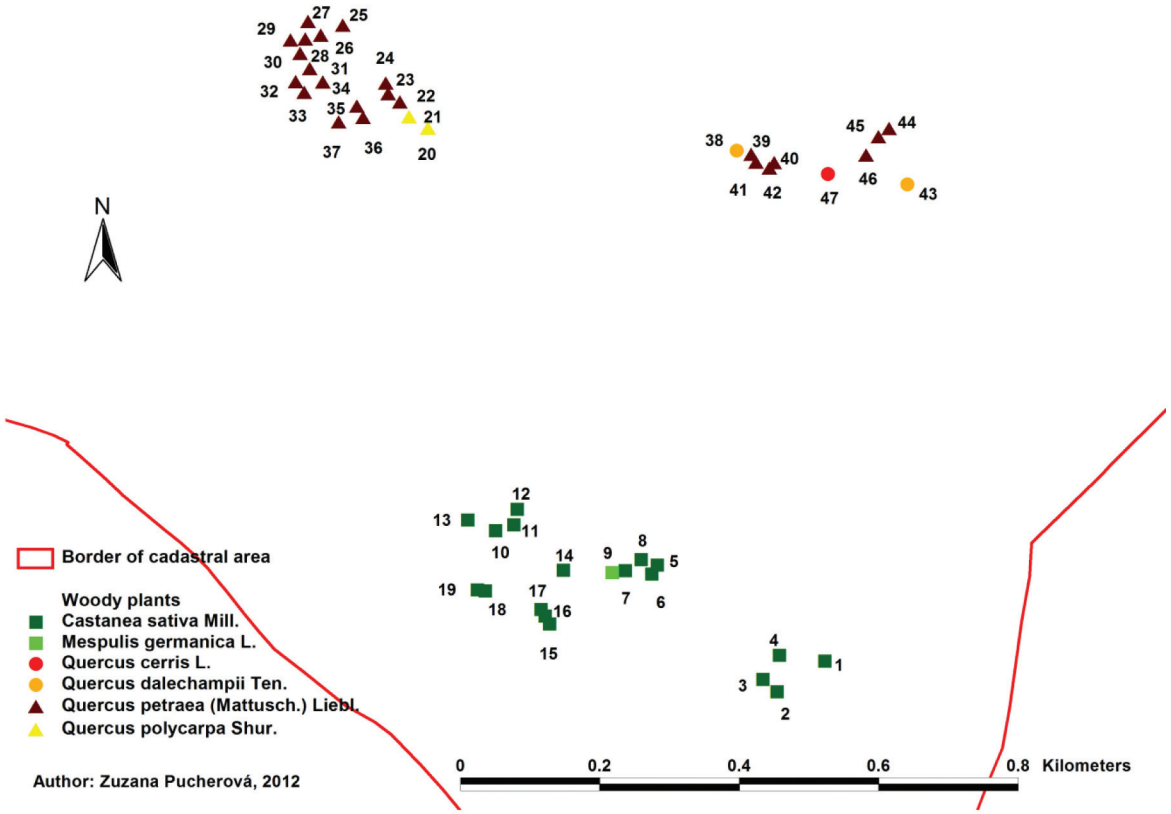

Fig. 4. Location of specifically and genetically significant trees in cadastral area Žirany.

Table 2. Description and parameters of rare tree species occurring in cadastral area of Žirany

S. n.	Species Latin name	Girth stem $h_{1,3}$ [cm]	Height [m]	Crown width [m]	Estimated age [years]	Position		Altitude [m]
1	*Castanea sativa* Mill.	330	18	7	300	N 48°36.338´	E 018°18.186´	270
2	*Castanea sativa* Mill.	300	20	12	300	N 48°36.292´	E 018°18.108´	279
3	*Castanea sativa* Mill.	310	18	9	300	N 48°36.289´	E 018°18.084´	280
4	*Castanea sativa* Mill.	330	20	10	350	N 48°36.323´	E 018°18.094´	271
5	*Castanea sativa* Mill.	270	22	8	300	N 48°36.360´	E 018°17.863´	296
6	*Castanea sativa* Mill.	350	16	8	350	N 48°36.357´	E 018°17.860´	296
7	*Castanea sativa* Mill.	220	16	9	300	N 48°36.364´	E 018°17.834´	299
8	*Castanea sativa* Mill..	280	14	11	300	N 48°36.368´	E 018°17.819´	301
9	*Mespulis germanica* L.	shrubby sprout shape	6	6	100	N 48°36.361´	E 018°17.806´	300

Table 2. Description and parameters of rare tree species occurring in cadastral area of Žirany – continued

S. n.	Species Latin name	Girth stem $h_{1,3}$ [cm]	Height [m]	Crown width [m]	Estimated age [years]	Position		Altitude [m]
10	*Castanea sativa* Mill.	700	24	16	450	N 48°36.412´	E 018°17.798´	307
11	*Castanea sativa* Mill.	280	20	12	300	N 48°36.430´	E 018°17.819´	305
12	*Castanea sativa* Mill.	420	22	14	350	N 48°36.445´	E 018°17.815´	305
13	*Castanea sativa* Mill.	380	18	12	350	N 48°36.423´	E 018°17.743´	301
14	*Castanea sativa* Mill.	290	18	14	300	N 48°36.371´	E 018°17.644´	322
15	*Castanea sativa* Mill.	340	16	12	300	N 48°36.279´	E 018°17.613´	331
16	*Castanea sativa* Mill.	310	13	10	300	N 48°36.286´	E 018°17.606´	332
17	*Castanea sativa* Mill.	250	15	9	300	N 48°36.292´	E 018°17.600´	331
18	*Castanea sativa* Mill.	510	24	18	400	N 48°36.314´	E 018°17.495´	334
19	*Castanea sativa* Mill.	530	24	18	400	N 48°36.314´	E 018°17.480´	344
20	*Quercus polycarpa* Shur.	260	22	12	250	N 48°36.975´	E 018°17.335´	329
21	*Quercus polycarpa* Shur.	220	16	13	250	N 48°36.999´	E 018°17.280´	339
22	*Quercus petraea* (Mattusch.) Liebl..	310	18	18	250	N 48°36.995´	E 018°17.274´	338
23	*Quercus petraea* (Mattusch.) Liebl.	320	18	18	250	N 48°37.004´	E 018°17.252´	336
24	*Quercus petraea* (Mattusch.) Liebl.	310	24	18	250	N 48°37.025´	E 018°17.246´	335
25	*Quercus petraea* (Mattusch.) Liebl.	310	24	18	250	N 48°37.091´	E 018°17.152´	330
26	*Quercus petraea* (Mattusch.) Liebl..	390	24	18	300	N 48°37.074´	E 018°17.093´	334
27	*Quercus petraea* (Mattusch.) Liebl..	400	22	17	300	N 48°37.082´	E 018°17.089´	335
28	*Quercus petraea* (Mattusch.) Liebl.	260	18	12	250	N 48°37.069´	E 018°17.078´	341
29	*Quercus petraea* (Mattusch.) Liebl.	280	24	20	250	N 48°37.064´	E 018°17.051´	349
30	*Quercus petraea* (Mattusch.) Liebl..	280	18	16	250	N 48°37.054´	E 018°17.073´	348
31	*Quercus petraea* (Mattusch.) Liebl.	330	26	17	300	N 48°37.032´	E 018°17.095´	348
32	*Quercus petraea* (Mattusch.) Liebl..	290	25	15	300	N 48°37.023´	E 018°17.075´	341
33	*Quercus petraea* (Mattusch.) Liebl.	270	18	14	250	N 48°36.995´	E 018°17.111´	346
34	*Quercus petraea* (Mattusch.) Liebl.	370	16	12	300	N 48°36.999´	E 018°17.148´	342
35	*Quercus petraea* (Mattusch.) Liebl.	310	20	16	300	N 48°36.989´	E 018°17.207´	346
36	*Quercus petraea* (Mattusch.) Liebl.	260	17	15	250	N 48°36.976´	E 018°17.212´	339
37	*Quercus petraea* (Mattusch.) Liebl.	290	20	12	250	N 48°36.967´	E 018°17.162´	348
38	*Quercus dalechampii* Ten.	220	16	14	150	N 48°36.971´	E 018°17.945´	296
39	*Quercus petraea* (Mattusch.) Liebl.	170	10	7	100	N 48°36.971´	E 018°17.977´	281
40	*Quercus petraea* (Mattusch.) Liebl.	190	10	10	150	N 48°36.963´	E 018°17.988´	282
41	*Quercus petraea* (Mattusch.) Liebl.	240	12	14	200	N 48°36.957´	E 018°17.974´	281
42	*Quercus petraea* (Mattusch.) Liebl.	230	12	12	200	N 48°36.962´	E 018°17.987´	281
43	*Quercus dalechampii* Ten.	310	13	11	250	N 48°36.947´	E 018°18.269´	244
44	*Quercus petraea* (Mattusch.) Liebl.	390	22	16	300	N 48°37.008´	E 018°18.227´	247
45	*Quercus petraea* (Mattusch.) Liebl.	320	20	12	300	N 48°37.003´	E 018°18.205´	241
46	*Quercus petraea* (Mattusch.) Liebl.	270	16	15	250	N 48°36.969´	E 018°18.174´	251
47	*Quercus cerris* L.	240	12	12	200	N 48°36.952´	E 018°18.109´	271

Discussion

The total cadastral area of the village is the same (1,552.83 ha) in two time periods (1869 and 2012). Based on the evaluation of SLS, we can conclude that the area was evaluated in the course of historical development, not only used by man, but also directly influenced by anthropogenic activity. Two basic features of the landscape: forest woody vegetation and agricultural areas are the most significant elements in both landscape structures (HLS, CLS). From mutual comparison of HLS and CLS in cadastral area of Žirany a few changes results within each group of landscape features. Some of landscape elements of the SLS in the studied area between 1869 and 2012 were replaced by other groups. By mutual comparison of maps HLS and

CLS we can not only identify these changes (Fig. 3), but also quantify them through their mapping results of SLS. The surfaces with a change in their landscape elements occupy 450.86 ha (29.03%) of the total cadastral area. Modified areas are mainly located in the close vicinity with the urbanised area of village. The changes occurred at the expense of narrow-striped of arable land, crops and grass plots. Technical elements that are represented by industrial and agricultural technical areas were added to the CLS. Vice-versa, areas with constant group of landscape elements represent 1,101.97 ha (70.97%). They are particularly remote areas of continuous forest in south-western, northern and south-eastern part of the cadastral area and southeast corner of the cadastral area with agricultural land. At Fig. 3 cut-out segment of Žirany cadastre and comparison of land use form changes since 1949 to 2007 can also be seen. Aerial photos show changes from mosaic to large-scale agriculture structure.

Species of the genus *Quercus* sp. are among long-living trees with frequent occurrence of oversized individuals, together with other species they form the basic compositional element in the historic parks in the world, as well as in Slovakia, or in nature reservations, for example Kašivárová (Benčaťˇ, 1984; Kubišta, 2006; Feriancová and Štěpánková, 2006). In terms of species composition, all four species of the genus *Quercus* were identified in the phytogeographical zone Tribeč. They are also mapped in the cadastral area of Žirany. In detail research and mapping of oaks in Slovakia (Požgaj and Horváthová, 1986), *Quercus dalechampii* Ten. and *Q. polycarpa* Shur. were identified in the cadastral area of Nitrianske Hrnčiarovce and Kostoľany pod Tribečom, but the authors do not mention them in the cadastral area of Žirany. Our identification, including biometric data can be considered as original and important gene pool.

Castanea sativa Mill. is considered to be an old culture pulp in Slovakia with early introduction in the 13th century, first in the territory of so called Forgáč estate around the castle Gýmeš (Jelenec), which is a neighbour territory with cadastral area of Žirany (Benčaťˇ, 1984). In terms of gene pool values, occurrence of old and oversized individuals Benčaťˇ and Lindtner (1968) listed three largest individual chestnuts in Slovakia (1) – Častá, vineyards, $d_{1,3}$ = 231 cm, age 400–500 years, (2) – Častá, oak forest, $d_{1,3}$ = 189 cm, age 300–350 years, (3) – Častá, Lindtnerova garden, $d_{1,3}$ = 182 cm, age 250–300 years. In 1999, I personally identified (Supuka, not published) sweet chestnut tree *(Castanea sativa)* Mill. in area of Hodruša Hamre, Pazmányiho farmstead, the girth stem in $h_{1,3}$ = 720 cm, crown width from 17 to 21 m, 18 m height, age 350–400 years. The largest identified sweet chestnut tree in the land Žirany with its values (girth stem in $h_{1,3}$ = 700 cm, 24 m height, crown width from 16 to 18 m, age about 450 years) is a unique, historic and genetically very valuable tree in the study area.

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Zmeny v štruktúre poľnohospodársky využívanej krajiny a výskyt genofondovo významných stromov

Súhrn

Obsahom príspevku je zhodnotenie zmien v krajinnej štruktúre na území katastra Žirany v komparovaných rokoch 1869 a 2012. V druhej časti príspevku je prezentovaný výskyt genofondovo významných stromov identifikovaných na území katastra.

Zmeny v zastúpení krajinných prvkov, ich vnútorná štruktúra a plošno-priestorová distribúcia na území katastra je odrazom vlastníckych pomerov, foriem využívania zeme, intenzifikačných foriem najmä v poľnohospodárstve a socio-ekonomického rozvoja spoločnosti. Krajinná štruktúra bola zhodnotená z mapových podkladov a terénnym výskumom súčasného stavu. Súčasná krajinná štruktúra v roku 2012 bola hodnotená použitím 9-tich skupín a s celkovým počtom 44 krajinných prvkov, v roku 1869 bolo použitých 8 základných skupín a 19 krajinných prvkov. Najvýznamnejšie zmeny v druhotnej krajinnej štruktúre v rokoch 1869 a 2012 boli identifikované v nasledovných prvkoch v porovnávaných časových horizontoch: mierne zníženie podielu lesa (z 42,83 na 40,76 %), zvýšenie podielu nelesnej drevinovej vegetácie (z 0,33 na 4,00 %), zníženie podielu poľnohospodársky využívaných plôch (z 44,16 na 37,86 %), pokles plôch trávobylinných porastov (z 10,17 na 5,99 %) a zvýšenie skupiny sídelných prvkov (z 1,56 na 6,44 %). Významná zmena je zistená v premene mozaikovej štruktúry úzkopásových polí na veľkoblokové formy poľnohospodárskeho využívania krajiny.

Pri mapovaní prvkov súčasnej krajinnej štruktúry dôraz bol položený na priestorovú distribúciu a biodiverzitu drevín v skupine nelesnej drevinovej vegetácie (NDV).

Vo formáciách NDV bolo na území katastra identifikovaných spolu 6 druhov genofondovo významných, biometricky a vekovo nadštandardných drevín s celkovým počtom 47 jedincov. Sú to druhy: *Castanea sativa* Mill. (18 jedincov), *Mespilus germanica* L. (1 jedinec), *Quercus cerris* L. (1 jedinec), *Q. dalechampii* Ten. (2 jedince), *Q. petraea* (Mattusch.) Liebl. (23 jedincov), *Q. polycarpa* Shur. (2 jedince). Genofondovo významné dreviny boli tiež lokalizované pomocou GPS.

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