

Impact of land consolidation on the visual characteristics (scenery) of a landscape

Vplyv pozemkových úprav na vizuálnu charakteristiku (scenériu) krajiny

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Abstract

New spatial and functional rearrangement of the territory represented by the changed structure of the plots (change of the landscape structure) is one of the main and most visible results of a comprehensive landscape adaptation. Projects of comprehensive landscape adaptation are designed to accommodate for production and landscape value of the territory. Landscape structure belongs to the most important components of landscape character. The landscape structure was evaluated in three levels: historical structure (2nd military mapping), present-day structure (results of mapping survey in the frame of a comprehensive landscape adaptation) and the new landscape structure (results of the proposed plan of the functional rearrangement of the territory) based on the cadastral territory of Veľké Vozokany in Nitra region (near Zlaté Moravce), South-Western Slovakia. The changes in the landscape are identified by the rearrangement of the arable land, forests, vineyards, gardens, fruit gardens/plantations, permanent grassland, water surfaces, and other areas. In this contribution, we made an attempt to describe the role of the comprehensive landscape adaptations in the process of designing landscape changes which do significantly contribute to modification of the landscape character.

Keywords: land consolidation, landscape evolution, landscape adaptation, types of plots

Abstrakt

Pozemkové úpravy riešia nové priestorové a funkčné usporiadanie územia, ktoré je realizované zmenou druhov pozemkov, teda zmenou krajinskej štruktúry. Projekty sú koncipované tak, aby zohľadňovali súlad medzi výrobnými a krajinnými hodnotami krajiny. Krajinná štruktúra patrí k jednej z rozhodujúcich zložiek krajinného rázu. Krajinnú štruktúru posudzovaného územia sme hodnotili v troch úrovniach: historická krajinná štruktúra (2. vojenské mapovanie), súčasná krajinná štruktúra (výsledky účelového mapovania polohopisu v rámci projektov pozemkových úprav) a nová

štruktúra krajiny (výsledky návrhu všeobecných zásad funkčného usporiadania územia) na príklade katastrálneho územia Veľké Vozokany. Indikátorom zmien v krajine bolo využitie územia, ktorého základnými kategóriami boli v našom prípade orná pôda, lesné pozemky, vinohrady, záhrady, ovocné sady, trvalé trávne porasty, vodné plochy a ostatné plochy. V príspevku sme sa pokúsili popísať úlohu pozemkových úprav pri tvorbe a návrhu zmien krajiny, ktoré významne prispievajú k tvorbe krajinného rázu územia.

Kľúčové slová: adaptácia krajiny, druhy pozemkov, krajinný ráz, pozemkové úpravy, vývoj krajiny

Detailný abstrakt

Pozemkové úpravy riešia nové priestorové a funkčné usporiadanie územia, ktoré je realizované zmenou druhov pozemkov, teda zmenou krajinnéj štruktúry. Projekty sú koncipované tak, aby zohľadňovali súlad medzi produkčnými a krajinnými hodnotami krajiny. Krajinná štruktúra patrí k jednej z rozhodujúcich zložiek krajinného rázu. Krajinnú štruktúru posudzovaného územia sme hodnotili v troch úrovniach: historická krajinná štruktúra (2. vojenské mapovanie), súčasná krajinná štruktúra (výsledky účelového mapovania polohopisu v rámci projektov pozemkových úprav) a nová štruktúra krajiny (výsledky návrhu všeobecných zásad funkčného usporiadania územia) na príklade katastrálneho územia Veľké Vozokany. Indikátorom zmien v krajine bolo využitie územia, ktorého základnými kategóriami boli v našom prípade orná pôda, lesné pozemky, vinohrady, záhrady, ovocné sady, trvalé trávne porasty, vodné plochy a ostatné plochy.

Územie má ráz poľnohospodárskej krajiny (91 % zastúpenie ornej pôdy). V záujmovom území sa uplatňujú dva geomorfologické celky. V severovýchodnej časti územie spadá do Podunajskej nížiny, v severozápadnej časti do Hronskej pahorkatiny. Má charakter aluviálnej nivy obkolesenej pahorkatinným reliéfom. Ústredný vodný tok – Širočina vytvára svahové rozhranie medzi striedajúcimi sa územiami južnej, juhovýchodnej a severnej, severozápadnej expozície. Prevažujú veľkoblokovo využívané plochy, ktoré sú miestami rozhraničené drobnými plošnými a líniovými porastmi nelesnej drevinovej vegetácie. Územie má charakter silne zvlneného reliéfu s dlhými svahmi a výraznými údolnicami. Aj z tohto dôvodu je výrazne postihnuté vodnou eróziou, má nízke zastúpenie nelesnej drevinovej vegetácie. Pri návrhu novej, budúcej, krajinnéj štruktúry sa vychádzalo z identifikácie problémov v území. K hlavným oblastiam, ktoré sa identifikovali patrí: vodná erózia, povodne, nízka ekologická stabilita, podpora rozvoja rekreačného potenciálu územia, budúca výstavba rýchlostnej komunikácie, vysoký stupeň zornenia poľnohospodárskej pôdy a pod. Posúdiť a navrhnúť funkčné, priestorovo vhodné a hlavne estetické riešenie územia musí byť založené na kompromise a viacfunkčnosti navrhovaných opatrení. Návrh využívania krajiny do budúcnosti zohľadňuje súčasné trendy vývoja. Zamerali sme sa hlavne na ochranu a sprístupnenie všetkých pozemkov. Zmeny predpokladáme v miernom poklese ornej pôdy a trvalých trávnych porastov hlavne na úkor ostatných prvkov (komunikácie, ochranné opatrenia...). Ostatné prvky krajiny by mali ostať zhruba v nezmenenej podobe.

V príspevku sme sa pokúsili popísať úlohu pozemkových úprav pri tvorbe a návrhu zmien krajiny, ktoré významne prispievajú k tvorbe krajinného rázu územia.

Introduction

Landscape consolidations, in different forms, had been carried out on the territory of Slovakia since the second half of the 19th century. Declared main aim of a landscape consolidation is to harmonize present development trends (rational use of a territory) with preservation of the nature and country. Landscape consolidations are the major positive present day interventions and crucial tools for rural development in Slovakia and the whole EU as well (Muchová et al., 2009).

EU countries do “lose” ~1500 ha of arable land, Slovakia – 13.58 ha (Stredžanská, 2012), for infrastructure and urbanization on daily average. Improved landscape planning could minimize the impact of the landscape structure changes related to the degradation of the land and ecosystems diversity (Bürgi and Turner, 2002; Tarasovičová et al., 2013; Skokanová et al., 2012; Havlíček et al. 2012).

Comprehensive landscape adaptation brings a new spatial and functional rearrangement of a territory represented by changes of plot types (land-use), thus resulting in changed landscape structure. This very landscape structure significantly influences the landscape scenery, landscape perception, appreciation and relations to the country. It also forms the concepts of a desirable (optimal) state (Jančura, 2003).

Based on the example of Veľké Vozokany model area, changes in the secondary landscape structure which significantly influence the landscape scenery will be described.

Materials and Methods

Area of interest is the territory (987 ha) of the Veľké Vozokany (road-type) village (501 inhabitants, 52 inhabitants per km²) in Nitra region (near Zlaté Moravce). In the lowest parts of the land in the Širočina dale, a valuable landscape structure can be found. It starts with a reservoir and continues with niva of the Širočina watercourse up to the settled area of the village. On the contrary, “naked”, undulated planes of arable land “request” (in a new state) for at least an illusion of a real landscape.

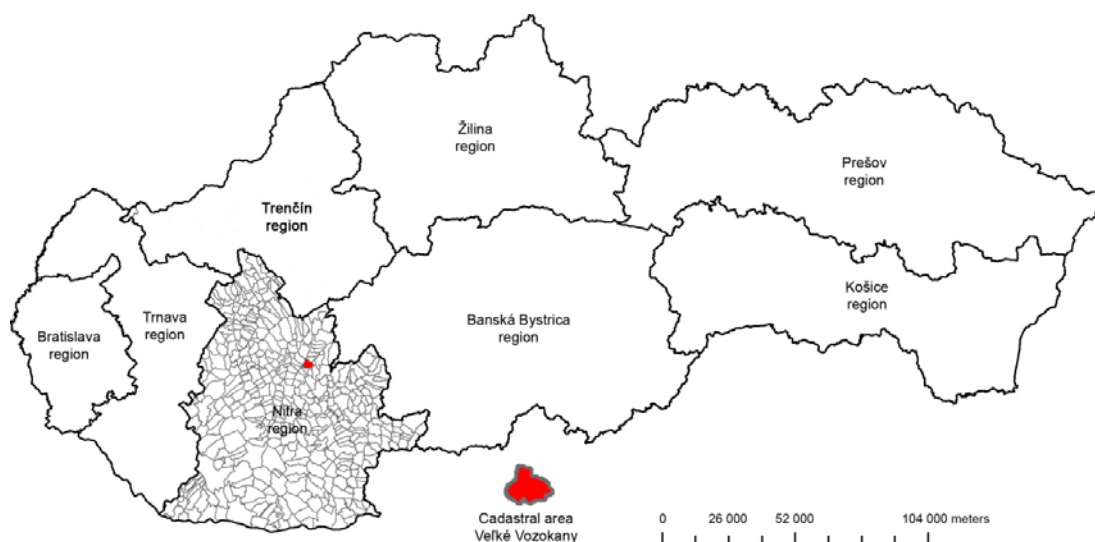


Figure 1: The location of the cadastral area of Veľké Vozokany on the territory of Slovakia

The territory is an agricultural one (91 % of arable land). North-east part belongs into the Danube lowland, north-west into the Hron downs. Main watercourse Širočina divides the areas with mainly south to south-east and north to north-west exposed slopes. Large blocks of the land are bounded by small patches or lines of woody plants. Long undulated planes with prominent slopes dominate the area. The territory suffers from significant water erosion. Continuous forests can be found in a single complex in the Starý háj area.

Intensive agricultural use of large blocks of the land (crossed/interrupted by roads and power-lines) is the most dominant anthropogenic influence seen in the territory.

A historical monument (original stone obelisk from 1734 replaced by the bronze lion in 1896), above the village itself, Bronze lion of Vozokany was erected in memory of a major defeat of Turks in 1652. Many religious objects forming the landscape character and scenery can also be found here (2 chapels, 2 stone sculptures, 7 crosses).

Land use as of 1843 was identified from the 2nd Austrian military mapping (scale 1:28800) accompanied by Basic maps of Slovak republic (scale 1:10000), orthophotos (scale 1:5000 from 2006/2007, © Geodis Slovakia, © Eurosense) and planimetric mapping results from landscape consolidation projects (Muchová et al., 2009). Maps have also been verified by surveys in the years 2010 and 2011. Maps of the landscape structure have been created in the ArcMap 9.3 GIS software. Design of future measures is based on the proposal for general principles of the functional rearrangement of the territory in the landscape consolidation project as registered in the cadastre of real estates.

Given the previous works (O'ahel' et al. ,2000; Petrovič et al., 2009; Skokanová, Havlíček, 2010; Mojses, Boltižiar, 2011) and our own research/surveys, each landscape element, from 6 main groups (arable land, vineyards, gardens, orchards, permanent grassland, forests, water areas, urbanized areas, other areas), has been evaluated for its positive or negative influence on landscape properties and functions.

Three horizons for secondary landscape structure have been considered:

- historical (2nd military mapping),
- present (results of planimetric mapping for landscape consolidation projects as of 2010),
- proposed (based on the proposal for general principles of the functional rearrangement of the territory).

Results and Discussion

Historical secondary landscape structure

Village location implies agricultural focus for human activities. Arable land occupied more than 62 % of the cadastral territory even in the year 1843 (tab. 1), on both sides of the Širočina stream which divides the land into its two main pieces. Occasional groups of woody plants could be encountered in the arable land. Main forests were concentrated in the western parts with some visible remnants still preserved. Forests formed the second most important landscape element (21%) at that time. Forests were also located in the eastern (bordering on Čierne Kľačany and Závada) and southern segments (towards Malé Vozokany). Širočina river bank trees have been

identified in the north. Permanent grassland (12.97 %) frequently accompanied the forests. Meadows were located near Širočina, some of them were flooded repeatedly. Settled village community was also located along the Širočina stream in the south, nearby Malé Vozokany village. Neighborhoods of the settlement were full of kitchen gardens. Small orchards, vineyards, church and mill have also been identified. Historical landscape appeared to be balanced with a proper representation of forests, meadows, fields, and water bodies. The countryside looked “natural” with some eye-candy scattered around.

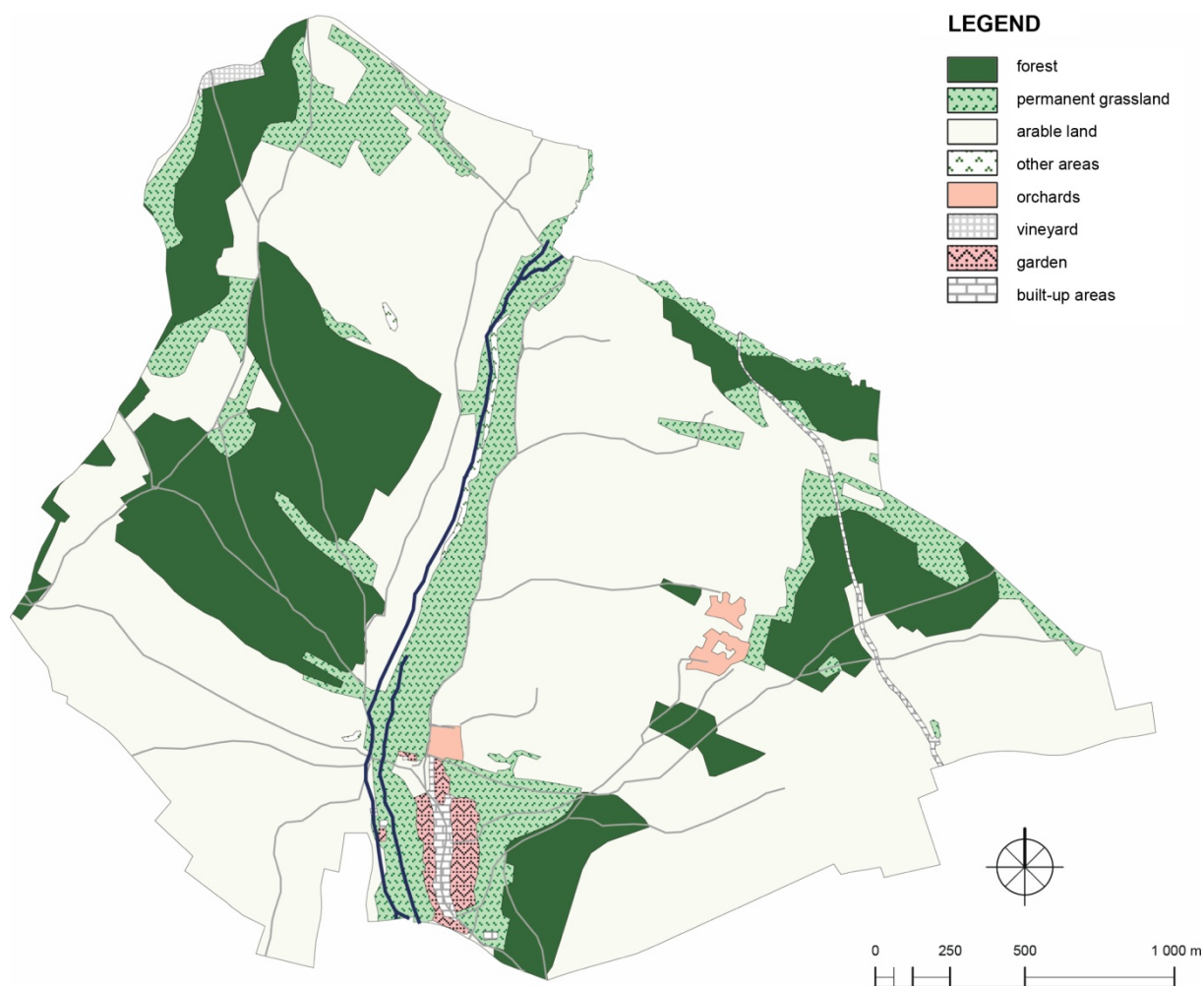


Figure 2: Historical landscape structure

Present-day secondary landscape structure

Collectivization in the 1950 led to new rearrangement of the territory. Boundaries, redundant crossings and roads/paths were removed. Sizes and shapes of the plots were modified for large-scale mechanized farming. Nowadays, the landscape still bears significant marks of the large-scale agricultural production. The landscape matrix is in many areas very simple, large fields of an intensively farmed arable land, large-block vineyards, hop-gardens, orchards, complexes of forested land and grubbed non-forest habitats overgrowing by woody plants. Results of planimetric mapping (i.e. mapping of the actual situation in the terrain and identification of changes with respect to the registered status in 3rd accuracy class with details at the

scale of 1:1000) have been used as a guide for the assessment of the present-day landscape structure.

Arable land area (67% of the territory) in 2010 was bigger by 44 ha compared with the status as of 1843. It is composed mainly by large field complexes in central, eastern and southern segments. Remnants of forests are located in western parts. Their size has been reduced almost by 2/3 to 77 ha (7.8%). As the landscape dominants emerged the reservoir (29 ha) in the central part of the territory and the vineyards (22 ha) in the northwest and northeast.

Full regulation of water-flows, amelioration, removal of boundaries, transformation of grassland into arable one are felt in the territory resulting in a low ecological stability, lesser esthetic appearance, and problems with the water in the area. Excess water runs down the slopes, sediments block watercourses and the reservoir. Desirable changes of the landscape structure can be brought about only by the comprehensive landscape adaptation that settles the ownership situation in the first place thus paving the way for resolving country needs.

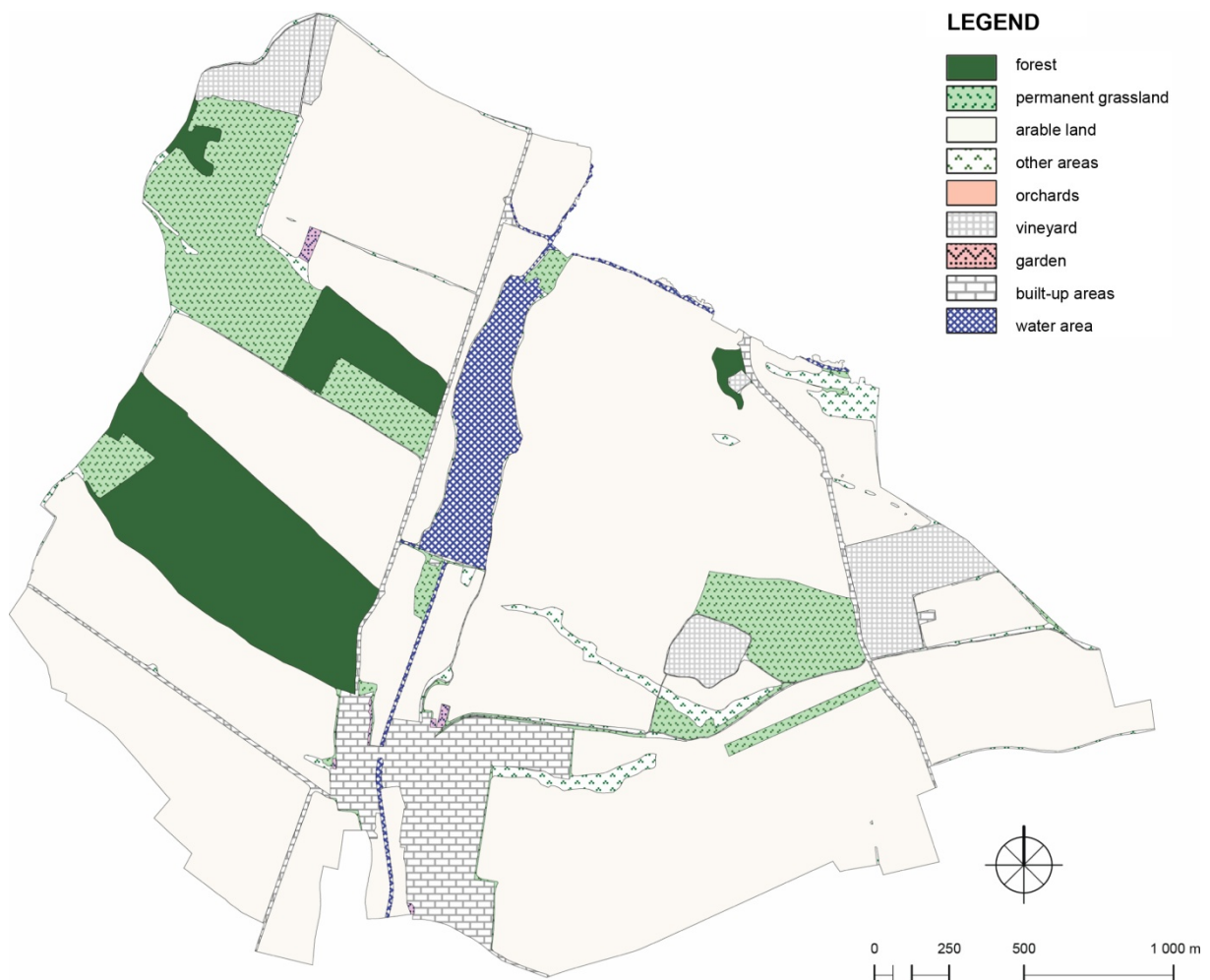


Figure 3: Present-day landscape structure

Proposed landscape structure

Proposal for future landscape structure addresses identified problems as water erosion, floods, low ecological stability, desired tourism expansion, planned highway, high utilization of farmland and aims at (multi)functionality and esthetic appearance.

Širočina stream accompanied by the reservoir form the green axis of the territory that must be sustained, enhanced by additional river bank vegetation and pathways (to avoid crossing of the main road that blocks access to the reservoir). River bank vegetation will set an appropriate scene diverting views from/covering large blocks of fields. A network of field roads has been proposed, aligned along crosses and always combined with lines of trees. The roads are designed not to be monotonous, they cross fields, grassland, edges of the forests, run along waterways and lead to a destination/sights (lookout, inn, monument, bench, etc.). The country has an enormous potential for tourism, cycling in particular. One example might be the cycling path towards Tesárske Mlyňany around the Vozokany bronze lion monument which will emerge from an often impassable dirt road after its reinforcement and will be framed by vegetation.

Landscape scenery of Veľké Vozokany will be significantly affected by a major body, new highway, for generations. Particular attention has also been paid to large blocks of arable land. Illusion of nature in these locations will be created by breaking of slopes by infiltration strips, field roads, and grassed thalwegs always combined with accompanying vegetation.

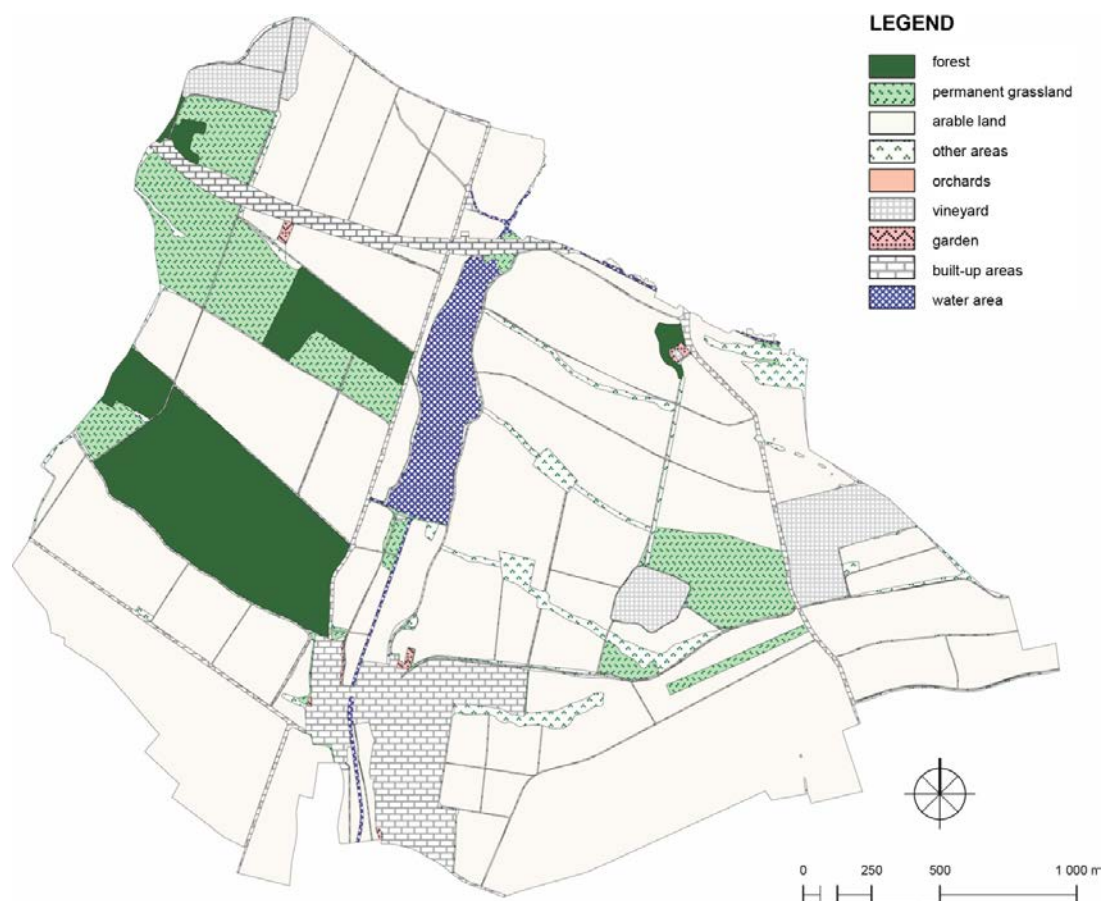


Figure 4: Proposed landscape structure (after land consolidation project)

Table 1: Representation of plot types in the Veľké Vozokany area

Veľké Vozokany – Representation of plot types						
Plot types	Historic landscape structure (year 1843)		Current landscape structure (year 2010)		Proposed landscape structure	
	ha	%	ha	%	ha	%
Arable land	618.11	62.63	661.85	67.06	654.50	66.31
Vineyards	1.00	0.10	22.00	2.23	22.00	2.23
Gardens	8.06	0.82	19.00	1.93	20.02	2.03
Orchards	5.30	0.54	0.60	0.06	0.60	0.06
Permanent grassland	127.11	12.88	113.02	11.45	75.95	7.70
Forests	213.01	21.58	77.00	7.80	77.00	7.80
Water areas	4.03	0.41	29.52	2.99	29.52	2.99
Urbanized areas	7.38	0.75	45.40	4.60	46.01	4.66
Other areas	3.00	0.30	18.61	1.89	61.40	6.22

Changes in the landscape element groups in the territory of interest can be determined by analyzing and comparing the secondary landscape structure in selected time-horizons. European trends of land use show increase in proportion of forest and non-forest woody vegetation as well as permanent grassland landscape elements mostly at the expense of the crops, see e.g. Pärtela et al. 1999; Garzia-Ruiza et al., 1996; Lipský, 2000; Olah, 2006; Blažík et al., 2011; Šolcová, 2013; Špulerová et al., 2011; Tomčíkova, 2011.

Proposal for future landscape use reflects current trends. Priority was given to the preservation and accessibility of the plots in the area. New elements (communications, protective measures, etc.) will be created; this will be accompanied with minor decrease of arable land and grassland areas. Remaining landscape elements remain more or less preserved.

Conclusions

Proposals created in the frame of a landscape consolidation project represent a final tool for landscape planning. All the proposals are discussed with the landowners that do often contribute a proportion of their plots for missing areas in the project of proposed measures and facilities. It is obvious that the success of a proposal is in the hands of landowners. They frequently understand the necessity of field roads, erosion and flood control. These measures tend to dominate the ecological/landscaping ones. Designers of landscape consolidation projects have sufficient room for accommodating both the land-use and esthetic functions of a landscape in their final proposals of the landscape rearrangement. In the model territory, we tried to harmonize them both. The agricultural mosaics significantly increase landscape diversity and this fact can be missed, if mosaics are delineated as one polygon.

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