

ISSN 1339-5270

LANDSCAPE STRUCTURE AND BIODIVERSITY OF WOODY PLANTS IN THE CADASTRAL TERRITORY OF KOLÍŇANY

KUCZMAN, Gabriel

Slovak University of Agriculture in Nitra, Slovak Republic

ABSTRACT

This paper is aimed at mapping the structure and biodiversity of non-forest woody vegetation in the cadastral of Koliňany, with the emphasis on species composition of the rural area of the village. Information was recorded on the basis of the areal non-forest woody vegetation according to the dendrological and structural reports, processed in the methodology [11]. In order to improve the quality of the landscape, areas were defined in order to complete the system of non-forest woody vegetation, on the criterion of endangering the area with the water and soil erosion, regulative of the optimal size of agricultural land, elements of ecological stability and application of the principles of aesthetics in the country.

The potential of the solved landscape area offers opportunities to the completion of the missing standards alongside the roads, forest boundaries, devastated areas, less fertile land, erosive areas and areas surrounding the water areas and channels. With respect to agricultural tradition, the municipality represents a great potential for the development of rural tourism.

KEY WORDS

Biodiversity of woody plants – Landscape architecture – Non-forest woody vegetation

INTRODUCTION

Over the past 15 years, extensive scientific, educational, governmental and political activities have been noticeable, aimed at protection of environment, strengthening the ecological stability of the country, with the aim of the maintenance and enhancement of biodiversity, but also the diversity of the country, the sustainable development of the country and preservation of life on Earth in its most diverse sense. Speaking of the country and its cultural character, we have to realize that the attitudes and the responsibility of the country depends on, amongst internal and external landscaping natural processes (such as tectonic processes, climate, water and impact of glaciers, etc.) the activities of a man. Cultural landscape is the result of cultivation of the land as a sort of the changed country, due to the rational and alternative inputs of a man into the country [10]. Socio-economic activities of a man cause active changes in the country. Qualitative and quantitative characteristics of the country are being changed, its natural, productive and social potential, its cultural and aesthetic values are changing, thus the overall picture of the country is altered. Rural settlements have also undergone profound socio-economic changes that are influenced by developments in agriculture, industry, changes in the living standards in the rural areas.

The changes are reflected in the urban and architectural structures according to [10]: amendments of building materials with a clear retreat elements of wood, oppression (disappearance) of the elements of vernacular architecture, penetration of high-rise buildings, change of the nature of street construction with a clear urban concept, socio-economic decay up to the limits of depopulation of scattered settlements, or their conversion into guest houses, the efforts to renew and reinvigorate the village (cheaper housing fund). The consequences of alternatives on the country image. Neo-urban, residential and redesigning activity in both rural and urban areas induced changes in the image of the country: change of scale, shape, weight and color, holding up of traditions and elements of historic architecture, swift shift of residence to the countryside, relative deficiency of cultural vegetation, the emergence of the phenomenon of the allotment, the emergence of industrial and commercial centers. The consequences of alternatives in agriculture on the image of the countryside.

With such topics treated in the publication [8] a picture of the coutryard in settlements of rural type.

Land reforms, variable home equity, cultivation method, intensification processes, have all had a direct impact on the development of the landscape image, which can be defined in the following manifestations of the landscape structures: segregation and separation of land, land consolidation, spacial and time change of the shape and the size of land, reduction of vegetation, line and solitaire of woody vegetation and natural habitats, change of the structure of the field roads network, change of the landscape scale, change of the mosaic and the color of the countryside, change (reduction) of the aesthetics and the landscape value of the countryside [10].

Non-forest woody vegetation (NFWV) is a significant spatial element of the agricultural landscapes. It has spatial, line, or group physiognomic ground plan shape. It creates a constellation of interconnected networks significant from the point of



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

view of territorial system of the ecological stability in the landscape area [3]. Significant deficit of eco-stabilizing element resulted in potential and real damages to agricultural soil by erosion. Slovakia has 47.7% (1 154000 ha) of the total agricultural land threatened by water erosion and 6.2% (150000 ha) by water erosion [4].

Woody vegetation forms the basic compositional element of the landscape image and its aesthetic, cultural and historical value. Forming landscape image is analyzed by and evaluated from different approaches and perspectives [2].

Conceptual computer aided modeling represents the effective way of virtual model creation, based on computer raphics application in the field of 3-dimesional space landscape modeling. This form of landscape representation onsists in compositional modeling of architectural and landscape elements [6].

Slovakia's rural landscape and rural population are seeking new forms and activities in the country which are associated with the food production containing a minimum foreign residues, with a high nutritional value and health safety (alternative, organic farming), thus fostering cultural and historical, demographic and ethnological, landscape and architectural values, including elements of the country households and especially religious architecture, increasing the potential of the rural tourism, recreation and sports, strengthening values and improving the quality of natural resources, gene pool values, the biodiversity values (wild life diversity and agricultural biodiversity), ie. natural and cultural [10].

MATERIALS AND METHODOLOGY

Geographically speaking, the territory constitutes of the plain to slightly undulating landscape of the warm climate. Territory cadastre of Kolíňany is situated in the South West Slovakia ,in the region of Nitra, where the fertile plane of the Danubian lowland slightly rises into the hills of Pribeč. The town of Kolíňany lies approximately 10 km Northeast of the district capital, the town of Nitra, at the crossing points of Tribeč mountain in the Žitava Hills, which makes the significant division of the surrounding terrain. This territory borders the cadastres of: Jelenec to the North, Žirany to the Northwest, Štitare Valley to the West, Pohranice to the Southwest, Host'ová to the South, Čeladice to the Southeast and Beladice to the East. The longest cadastral borders are those with the municipalities of Jelenec and Žirany. From the geomorphological view point the southern part of the cadastral border creates the Northern edge of the Danubian Lowland with the altitude up to 200 m. The smaller Northwestern part is filled with the Tríbeč Hills. They extend into the direction from the Southwest to the Southeast and start with the summit of Zobor (588 above the sea level). The average altitude of Nitra and Žitava panel is around 150 to 180 m. Natural conditions as fertile land, favorable climatic conditions and convenient location create an agricultural landscape.

The size of the cadastral area is 1,250.06 hectares, of which 59.62 ha are formed of non-forest woody vegetation [7]. The largest percentage is formed of woody vegetation of 18.11 hectares, and the riparian stand water stream of 18.13 hectares. The smallest is the shrubs areas represented by 0.50 hectares of the total area of non-forest woody vegetation. On December, 31st, 2013 the Statistical Office of SR Bratislava reported 1,583 inhabitants for this area.

The village of Kolíňany does not currently possess the land-use planning documentation on the community level. The previous land-use planning was made in 1979, however, the documentation has not been preserved. The threshold requiring a community to have a land-use plan is being lowered to 1,000 inhabitants. The village of Kolíňany, however, initiated the acquisition of the land-use planning on their own. Under the electoral program for the period 2007-2010 the following projects were designed to launch: land-use plan of the community and the Corporate Social and Economic Development plan. Except for the relative institutions and neighboring communities, the inhabitants have taken part in those project. The aim of the land-use is to provide a long term strategy for the development of the environment of the community, while retaining the main elements of its identity, enhanced with respect to the restrictions of various sorts [14], [1]. As a part of the surveys and the analyses of the municipality of Kolíňany, the ecology of the landscape plan was made by addressing the preservation of ecological stability of the land.

The municipality of Kolíňany also contains a museum that represents the original vernacular architecture. It is a good example of how to bring customs, traditions, material and spiritual culture of our ancestors to younger generation. Potentially natural vegetation of the area is represented by primarily oak tree and hornbeam forests of the Carpathian and Pannonian Basin, apart from the communities bound to the isolated island of the Kolíňany hills. There, the vegetation is represented by the Austrian oak-tree forests. The cultivated cultures on arable land, grassland, fruit-trees and vineyards, forests and scattered non-forest woody vegetation constitute the current landscape structure.

Dendrological and structural records of the area were conducted according to the methodology of [11]. Fieldwork survey in the cadastre of the municipality of Kolíňany was carried out in the growing seasons of 2011-2013 with Feriancová and Kuczman being coauthors. The work was a part of the grant project KEGA no. 020SPU-4/2011 in the Department of Garden Architecture, Faculty of Horticulture and Landscape Engineering, SUA in Nitra, from 2011 to 2013 as one of the nine model areas.

Structure of various loggings was arranged in tables and consisted of the following information:

1. The structure of particular records is following: in case of signing in the cadastral territories Kolíňany - Koxx. 2. Non-forest woody vegetation type: it represents the spatial arrangement of particular non-forest woody vegetation elements. TP – areal type, TL – linear type, TS – group type, TSI – solitary type

3. Origin of non-forest woody vegetation: it describes the originality of mapped elements. PP – original, natural, PK – cultivated, planted, PZ – mixed, combination of PP and PK



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

4. Functional categorisation of non-forest woody vegetation: it classifies particular elements of non-forest woody vegetation to categories according to their functionality, location and impact on the landscape. FV – windbreak, shelterbelt, FSVT – accompanying vegetation of a watercourse, FSVP – accompanying vegetation of a body of water, FSC – accompanying vegetation of a roads (communications), FSŽ – accompanying vegetation of a railways, FR – groves, clusters of trees, FM – field baulks, boundary lines, FKP – shrub growths on pastures, FO – orchards, FV – vineyards, FZ – gardens, FA – alleys in the landscape excluding accompanying vegetation, FIN – other undefined

5. Internal structure of non-forest woody vegetation: it characterises the internal structure of particular non-forest woody vegetation elements in following steps:

- Layered structure, where E2 = shrubs and young trees to the height of 3 m, E3 = trees and high shrubs with a height above 3 m,

- Vegetation cover height (m) - average height of the vegetation cover for each layer

- Vegetation cover width (m) – average width of the vegetation cover for each layer

- Covering capacity (%) - represents the density in the canopy part of the vegetation cover separately for each layer

- Area (ha) - informs about an area that covers an areal type of non-forest woody vegetation elemen

- Representation of woody plants (%) - represents the percentage of each woody-plant species observed in both layers of the assessed NFWV element, which is alphabetically ordered; names of woody plants are given in Latin scientific terminology.

When identifying rare species, dendrometrically oversized and of an evidentially high age, we performed measurements of tree height and trunk circumference at the height of 1.3 m above the ground, and we estimated their age. At the same time, each tree was localised using GPS and recorded in the category of rare and commemorative trees as a natural element significant culturally, historically and in terms of gene pool. To identify changes in the representation of non-forest woody vegetation elements in the landscape area, we used digitised maps from the period of the second military mapping, then the period before collectivisation of the agricultural landscape (1949) and the current state (2010, resp. 2012). For the current landscape structure, we processed also areal representation of non-forest woody vegetation elements. Using the map of potential water erosion in the studied territory and taking into consideration the limit criteria for optimisation of the landscape structure, we proposed to supplement the system of non-forest woody vegetation in studied cadastral territories [12].

RESULTS

Identifying changes in a landscape structure, reflect the social and economic development of the area and the land owners (Supuka 2013). Areas of non-forest woody vegetation in the land registry of Kolíňany exist in the form accompanying vegetation alongside rivers and roads, hedges, remains of scattered orchards and vineyards, surroundings of the Kolíňany hills. These categories in addition to the NFV production and landscaping features fulfill the biotic function.

Compact areas of forests are preserved in the Kolíňany hills, apart from its southern slope. The potential of natural vegetation is represented by the Austrian oak-tree forests. In addition to the common oak (*Quercus robur L.*), Scots pine (*Pinus sylvestris L.*) is also widespread. Forest growth has been degraded by the invasive allochthonous species of tree of heaven (*Ailanthus altissima (Mill.*)) and black locust (*Robinia pseudoacacia L.*).

This area of forest takes up the area of 88.95 hectares [7]. An important element carrying the identity of historical continuity of the village is the former Romanesque church, and the hill on which it was built. Cultural and historical significance of this object should be enhanced with the reconstructed forest area and with the supplemented elements of landscape architecture. Area should be enriched with interesting information about the biota and the cultural and historical context of the site. On the southwest slope of the Kolíňany hills, steppe alike vegetation can be found on a compact area. These are xerotherm grasslands with restricted occurrence in Slovakia. The vegetation is grouped as biotope of European importance as herbs and shrubwood vegetation on calcareous substrates. Within the reconstruction of the forest vegetation it is important to enhance the natural character of the place. Interference with tree species composition must be carried out in the direction of removal of some allochthonous tree species such as tree of heaven (Alianthus altissima L.) and black locust (Robinia pseudoacacia L.). The same needs to be done with the random shrubs and lianas such as traveler's joy (Clematis vitalba L.) and (Rubus fruticosus L. agg.) which block the forest pathways. The Kolíňany hills are the protected area of the military training ground in the range of 10 m, which is important to bear in mind when doing the forest reconstruction. One of the goals in the context of planning is to build an observation tower on the Kolíňany hills, mark the pathway for tourists and scientists on the Kolíňany hills and into the vineyards. The goal of the reconstruction could also be to use tradition, cultural, historical and natural values with the aim of developing tourism. In the following picture C.1 we can see this cadastral map of the village Kolíňany from 2012 [12] indicating the mapped areas of non-forest woody vegetation. The mapping was carried out on each marked area NFWV with detailed criteria described in the methodology of this paper. The largest representation of non-forest woody vegetation is located eastern of the urban area. These areas are currently the most utilized agricultural areas.



2014, Number 4, Volume 2, date of issue 28th November 2014.



Picture. No. 1 – Current landscape structure of the Kolíňany cadastral territory in 2012 yer and proposal for changes Elaborated: Karol Šinka, Ján Supuka, 2013, [12]

Eastern part of the cadastral territory consists of areas and belts of non-forest woody vegetation merging into communicational ranges, scattered spots of NFWV behind gardens, areas around the dam and accompanying woody vegetation along the creek of Bocegai. This part of the cadastral territory was greatly removed with the aim of blending the farmland. The most fundamental interventions were carried out in the 2nd half of the 20th century. The vast majority of these were on the elimination of the natural non-forest woody vegetation. In this part the areas were mapped out as follows: KO54, KO53, KO64, KO 66, KO68, KO22, KO26, KO62, KO67, KO32, KO41, KO30, KO47, KO39, KO44, KO01, KO28, KO02, KO25, KO38, KO43, KO40, KO46, KO34, see picture no. 1. Elements of NFWV is manifested mostly in the form of natural elements, only in the vicinity of the cottage area with lots of artificial planting of NFWV. The analyzed area of the non-forest woody vegetation in the natural form, a vast majority of indigenous trees such as Acer platanoides L., Acer campestre L., Fraxinus angustifolia Vahl., Quecus cerris L., Salix alba L., Populus nigra L., Populus alba L., Malus sp, and allochthonous species of acacia Robinia pseudoacacia and Elaeagnus angustifolia . As for shrubs: Rosa canina L., Sambucus nigra L., Cornus mas L. and lianas Clematis vitalba L. and Rubus fruticosus L.. Fruit trees are represented by Padus avium Mill., Prunus cerasifera Mill., Malus domestica Borkh., Juglans regia L. Dust suppression in the agricultural land by the form of vegetation elements is very important. In the recent years, due to drier months the dustiness has significantly increased in the country and adjacent urban and rural settlements. The group elements of the agricultural crops are represents by vast arable land, especially in the southern and south east parts of Kolíňany. According to Pucherová (2004) it forms 806.68 hectares. To avoid the dustiness and also in the interest of increasing biodiversity of woody plants, it is necessary to extend the woody vegetation of other natural species. We propose adding the following autochthonous trees: oak (Quercus robur L.), small-leaved linden (Tilia cordata Mill.), leaved linden (Tilia plathyphyllos Scop.), Norway maple (Acer platanoides L.), field maple (Acer campestre L.) and woodland hawthorn (Crataegus laevigata) (Poir.) DC . We also suggest the fast-growing species of white poplar (Populus alba L.) and black poplar (Populus nigra L.). These plants need to be planted in the vicinity of agricultural land which is subject to severe wind erosion with fast effects. Supplemented with a combination of moderately long-lived and long-lived woody plants greater stability of the area will be achieved. Since, the old and wellestablished sorts of fruit trees in cultural habitats were removed by the agro-ameliorative and artificial cropping interventions in agricultural land, we propose adding the following sorts: wild cherry (Padus avium Mill.), domestic service trees (Sobrus domestica L.), mulberry (Morus alba L.), almond (Amygdalus nana L.), imperial walnut (Juglans regia L.), mountain-ash (Sorbus aucuparia L.), common hazel (Corylus avellana L.). Many of them provide an interesting blooming



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

effect in the spring in the countryside. This type of NFWV provide an important biotic function as well as the productive and landscaping one. As for the bush forms of non-forest woody vegetation we propose adding the following species : dog-rose (*Rosa canina L.*), *Rubus fruticocus L. agg.*, elderberry (*Sambucus nigra L.*), dogwood (*Cornus mas L.*), *Viburnum opulus L.*, wild privet (*Ligustrum vulgare L.*). By completing the missing lines of vegetation (habitat corridor and areas of NFWV) alongside the roads, the linking of bio-centers in the countryside will be achieved.

Supuka and his colleagues suggest [12] adding the elements of NFWV in the county of Badica to partially eliminate the negative features threatening the large areas of arable land. They suggest primarily planting the linear formations running along streams and canals, field trips and on the slopes with the erosion potential. Areas of individual units should not exceed 50 hectares and features of NFWV share would be increased by 17.07 ha (from 2.60% to 6.74%) which would be in accordance with the recommended optimization of the landscape structure. From the perspective of the development of tourism in the micro-region, they propose building of cycling routes. These routes should lead through a part called Baratsko and further along the secondary roads to the village of Beladice. The proposed cycling route should be a part of the regional cycling route under the mountain of Zobor. A suitable form of application supporting NFWV should stand behind this proposal.

Indicated that the organic more stable component of the current green infrastructure of Tvrdošovce, is almost exclusively composed of elements of non-forest woody vegetation, in which he includes elements supporting woody vegetation by the roads and waterways, windbreaks, hedgerows, woody vegetation, old orchard in the open countryside along a stream of water, partial woody vegetation of the former sand mines [13].

Its location near the centers of recreational and agricultural activities of the region constitutes a prerequisite for the development of rural tourism. The emergence and development of rural tourism farms and similar themed places depend on the initiative of private entities operating in the field of agriculture. The supposed location of their implementation is in the southeastern part of the cadastral territory. The farmland of Baratsko seems like a good prospect . The suggestion would be supported from the point of view of the supposed growth and development of rural tourism of this area, by the intervention with linear elements of the non-forest woody vegetation.

Group elements of watercourses and areas represented by watercourses within the scope of 16.87 ha in the cadastral of Kolíňany, as reported by [7]. On the watrecourse of Bocegaj in the cadastral municipality of Kolíňany, a reservoir Kolíňany was built on the area of 9.8 hectares, (see picture 2) the stream is regulated by the reservoir, currently serving for breading fish and as a system providing irrigation for agriculture. This local bio-center has the potential of various use for recreation, with the possibility of adding small objects and elements of landscape architecture. This area represents a meaningful biotic element of the countryside. This water resource has the certified first class hygienic protection.



Picture. No. 2 View to the water reservoir of Kolíňany (2014) Picture. No. 3 View to the stream of Bocegaj with current vegetation (Kuczman, 2014) (Kuczman, 2014)

On the floodplain of the Bocegaj creek there are the naturally bound communities of lowland forests and floodplain forests of poplars. Currently, the creek trough is being cleaned and regulated. The majority of the non-forest woody vegetation is represented by the riparian vegetation of water-logged soil. This area forms a biotope of the local importance. Woody vegetation consists of willow and poplar trees on water-logged soil. They are located in the central part of the cadastral municipality of Kolíňany. Poplar tree family is represented by the white poplar (*Populus alba L.*) and poplar (*Populus tremula L.*), willow (*Salix alba L.*). Shrubs consist of: willow (*Salix fragilis L.*), gray willow (*Salix cinerea L.*), blackthorn (*Prunus spinosa L.*), dog rose (*Rosa canina L.*). As for lianas - white clematis (*Clematic vitalba L.*) is widespread.

These habitats can be included into the habitat of poplars and willow lowland floodplain forests. Riparian woody vegetation is on the map (picture 1) marked as KO65, KO87, KO94, KO92, KO88, KO10, KO86, KO12, KO83, KO24, KO3, KO89, KO11 and extends from the lake into the southeastern direction along the creek of Bocegaj. Riparian vegetation is an important part of the natural environment and creates the necessary link between the water features and the landscape. The minimum range of biotopes of the wetland type should not fall below 0.5 ha. This biotope certainly fulfills that condition.With the aim of maintaining and supporting the ecosystem it is necessary to plan out the woody vegetation in accordance with the system of qualitative and quantitative protection of water resources. The problem is the draining of



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

rainwater from the site 'Mokrina' 'on the western outskirts of the village. The land-use plan of the municipality suggests the reconstruction of the existing ditches and completion of further ditches so that the draining of rainwater flows into the watercourse of Bocegaj. As part of the proposal, the following riparian vegetation is suggested to add: woody plants of the genus poplar (*Populus alba L., Populus nigra L., Populus tremula L.*) and the willow genus (*Salix alba L., Salix viminalis L., Salix caprea L.*). The biodiversity of trees could be enriched by the following species: alder (*Alnus glutinosa Gaertn.*), *Frangulus alnus Mill.*, narrow-leafed ash (*Fraxinus angustifolia L.*). The riparian vegetation along the creek should have a similar vegetative hydrophilic character such as the one surrounding the stream . In these areas, we suggest the use of domestic plants from the genus *Acer, Alnus, Frangula, Fraximus, Populus, Salix, Sambucus, Staphylea, Ulmus* that bear the water-logged soil well. Increased biodiversity on these water-logged soils could contribute to the higher effect of ecological stability.

The objective of the linear elements of NFWV is creating a bio-corridor of the local interests which would interconnect the neighboring bio-centers. The width of the green belt of non-forest woody vegetation should not be less than 15 m and its length should not exceed 2 km. In some parts of the stream, the width is limited by roads. In addition to providing important hydrological function, woody riparian vegetation also serves as the erosion control in the agricultural landscape.

The negative impact of the missing vegetation is manifested in clogging of the water reservoir by the suspended load. The research results of the years 1974-1986 to 34 different small water reservoirs in Slovakia showed clogging of the reservoirs by erosion of sediments (suspended loads) as 3.5 to 83.5% of the reservoir scope while annual loss of capacity of the reservoir is 0.32 to 9.3%. The majority of them becomes clogged sooner than the projected expectancy of 100 years. There is a need for cleaning of these reservoirs every 15 years, in some cases even more frequently [10].

The surrounding cottage area contains artificially planted trees without a landscape plan. Most predominant are the allochthonous tree species such as *Rhus typhina L., Hippophae rhamnoides L., Weigela hybrida L., Deutzia scabra Thunb., Eleagnus angustifolia L., Syringa vulgaris L., Spiraea douglasii Hook, Symphoricarpos albus L., Blake and the like. They form a surrounding border of the privately owned cottage areas. It is definitely necessary to prevent aggressive expansion of the allochthonous species that could escalate over time and outgrow the indigenous tree species.*

Within the cadastral territory of Koliňany amogn the NFWV, indigenous plants dominated the allochthonous trees, which is in line with NFWV rules of the use of woody plants in the landscape area. Amongst the shrubwood vegetation the dominant species are those of the following genera: *Cornus, Sambucus, Crataegus* and *Rosa, Salix*. The tree vegetation along watercourses and the dominant species are those of *Salix* and *Populus*, along the roads fruit trees of the genus *Cerasus, Juglans, Malus, Prunus* dominate the area. As for the linear elements of the non-forest woody vegetation locust (*Robinia pseudoacacia* L.) is the most frequent one, which should be gradually eliminated annually by the proper maintenance of an unincorporated area. The following deciduous trees exist: *Acer, Prunus, Juglans, Fraxinus, Malus.* Conifer - *Pinus sylvestris L.*. A system of completing the landscape was proposed by Supuka and colleagues [12] according to the criteria of endangering the land by water erosion and hunting regulations, distribution of elements of ecological stability and application of aesthetic regulations for landscape creation.

DISCUSSION

Spectacular changes in agglomeration processing of the agricultural landscape and subsequent consolidation of former private land into large-scale economies of the cooperative kind (plot size 10-200 ha) were also associated with the disposal and decay of the dominant eco-stabilizing element of the landscape, ie. Non-forest woody vegetation, their shaping and spatial formation, as well as the rare biotopes that are representative of distinctiveness and originality of the country, but also the value and nature conservation. This is illustrated the most in the lowland of Slovakia (Supuka 2004). These radical interventions are confirmed in the cadastral territory of Kolíňany, especially in the southeast area.

From the point of view of the species composition in Slovakia, [9] states that 20 to 30 kinds of trees were planted in the windbreaks, of which one third accounted for allochthonous species. He indicates at least some of the most commonly used species of the genera: *Acer, Fraxinus, Populus, Quercus, Sorbus, Tilia, Aesculus, Morus, Robin* (maple, ash, poplar, oak, rowan, lime trees, buckeye, mulberry, acacia). Apart from buckeye (*Aesculus*) and mulberry (*Morus*) all the other sorts of trees exist in the windbreaks. Oftentimes, those are only the remains of windbreaks or scattered forms of the vegetation alongside the roads.

The consequences of water-regulating and aquaculture activities are manifested in the form of transformation of the country, increasing the proportion of water areas in the country, in the reduction of riparian vegetation, the reduction of riparian woodland and hydrophilic biotopes and as the creation of gross geometric mosaic landscape structure (Supuka 2004). In the cadastral of Kolíňany the water level varies with the influence of water reservoir regulation, which results in the reduction of some hydrophilic species mainly in the sublittoral and eulittoral zone of riparian vegetation. On the contrary, due to strongly expanding species, some parts of the canal are clogged by cane (*Phragmites communis Trinius*.). We propose reducing or eliminating it in some sections of the creek. Accompanying vegetation of the canel Bocegaj from the point of view of the invasive species is in some sections expanded by locust (*Robinia pseudoacacia L*.). This is due to the consequences of the regulation of water in the stream. According to [5], the sustainable use of water resources in the basin reaches only the restoring of the hydrological cycle, which most closely approaches the original condition.



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

CONCLUSION

The current state of non-forest woody vegetation in terms of biodiversity and nature are considered as quite acceptable. Maintenance of the preserved forms of vegetation is necessary, with the gradual replacement of suitable tree species in the landscape area. We consider the radical removing of non-forest woody vegetation from the eastern part of the cadastral territory with the aim of uniting the farmland, as a disadvantage. In the cadastral area of Kolíňany segments of accompanying vegetation, NFWV alongside the roads, water reservoir and creeks are missing.

It is necessary to complete the bio-corridors with the appropriate forms and types of woody vegetation because they have important implications in the countryside. Additional planting of woodland is neither being carried out nor was it carried out in the recent years between 2011 and 2013 in the village. Maintenance of the landscape is spontaneous, in terms of tree species elimination if safety is endangered or passableness limitation. Seeding of invasive species needs to be eliminated and replaced by planting of the autochthonous woody plants.

Biodiversity of tree species could be supported in the way of utilizing domesticated fruit species, or species of interest for boosting the domestic gene pool with the old fruit species. When designing surfaces of NFWV, it is necessary to consider the longevity and stability of the area of woody plants. The solution of the landscape area offers a huge potential of possibilities of completing the missing lines along the roads, boundaries of forests, devastated areas, areas of less quality and scarce fertility, erosion areas and areas surrounding the water areas and channels. The village has the land-use plan which offers several solutions of activities needed in the village, primarily aimed at supporting the rural tourism and preserving the ecological stability.

From that perspective, it would be interesting to select a few resting points in the landscape area, with the view on the interesting landmarks, which there are several in the village. The aim of the proposal is to provide a long term strategy for the development of the village, with preserving and promoting its identity.

Preservation of the natural systems in the country for future generations requires purposeful control and motivating the interaction between economical development and environmental status through implementation of a complex policy of sustainable development [5].

This paper has been completed thanks to the financial support of the grant project KEGA no. 001SPU-4/2014 green infrastructure and urban agriculture and KEGA no. 003SPU-4/2014 non forest woody vegetation in the country, its biodiversity, gene pool and the significance of landscape architecture.

REFERENCES

- [1] Coplák, J.,: Program hospodárskeho a sociálneho rozvoja obce Kolíňany. (The economic and social development of the village Kolíňany). 2013, Ecoplán, 82 p. [in Slovak]
- [2] Feriancová, Ľ., 2005: Obnova zelene vidieckeho sídla. (Renewal greenery of the rural settlement). Nitra: SPU, FZKI KZKA. 91 p. ISBN 80-8069-512-1. [in Slovak]
- [3] Forman, R. T. T., Gordon, M., 1993: Krajinná ekologie (Landscape ecology). Praha: Akademia, 583 p. ISBN 80-200-0464-5. [in Czech]
- [4] Grešová, L., Streďanský, J., 2011: Veterná erózia v krajine súčasné trendy, metódy a spôsoby výpočtov. (Wind erosion in the landscape-cerrent trends and methods os assessment). Nitra: SPU, 108 p. ISBN 978-80-552-0572-4.
- [5] Mojses, M., 2009: Postavenie mokraďových ekosystémov v rámci integrovaného manažmentu povodia. (Status of Wetland Ecosystems Within an Integrated River Basin Managment). Bratislava: SAV, Životné prostredie. Vol. 43, No. 6. 336-339 p. ISSN 0044-4863.
- [6] Moravčík, Ľ., 2010: Konceptuálne modelovanie a dynamické prezentácie v krajinnej architektúre. (Conceptual modeling and dynamic presentation in landscape architekture). In: Krajina predmet vzdelávania a výskumu. Bratislava: Perfekt, 63–82 p. ISBN 978-80-8046-452-3.
- [7] Pucherová, Z.: 2004: Vývoj využitia krajiny na rozhraní Zobora a Žitavskej pahorkatiny (na príklade vybraných obcí).
 (Land use form development on the boundary of Zobor and Žitava highland). Nitra: FPV UKF, Edícia: Prírodovedec No. 141, 147 p. ISBN 80-8050-735-X.
- [8] Rózová, Z.: 2001: Picture of the courtyard in settlements of rural type. In: Bratislava: SUA, Actahorticulturae et regiotecturae. 7, no.1, 23-26 p. ISSN 1335-2563.
- [9] Supuka, J., 2001: Plošná a bodová zeleň v krajine, jej štruktúra a možnosti obnovy a novej tvorby v podmienkach Slovenska. (Area and point greenery forms in the landscape and possibilities for the renovation and new designing in Slovakia, conditions). In: Prudký, J. (ed): Obnova plošné a bodové zeleně v krajině. Brno: MZLU, 72-79 p. ISBN 80-7157-515-1.
- [10] Supuka, J., 2004: Alternatívy využívania krajiny a jej kontinuálne premeny. (Alternative land use forms and their continual changes). Životné prostredie, Vol. 38, No. 2, ISSN 0044-4863. p. 72-76



2014, Number 4, Volume 2, date of issue 28th November 2014.

ISSN 1339-5270

- [11] Supuka, J., 2011: Mapovanie prvkov nelesnej drevinovej vegetácie v poľnohospodárskej krajine. (Survey of the non foresty woody vegetation in agriculture landscape). Metodická príručka, projekt KEGA 020SPU – 4/2011. Manuscript, 8 p.
- [12] Supuka, J., Šinka, K., Pucherová, Z., Verešová, M., Feriancová, Ľ., Bihuňová, M., Kuczman, G.: 2013: Landscape structure and biodiversity of woody plants in the agricultural landscape. Brno: MZLU, 186 p. ISSN 1803-2109.
- [13] Tóth, A. Feriancová, Ľ.: 2013. Zelená infraštruktúra ako efektívny nástroj na ochranu a tvorbu udržateľnej krajiny. Green Infractructure as an Efficient Tool for Protection and Design of Sustainable Landscapes). In: Igaz, D. (eds.): Nitra: Enviro. SUA. 179-787 p. ISBN 978-80-552-1101-5.
- [14] [on-line] Available on URL: http://www.kolinany.eu

CONTACT ADDRESS:

Author:	Ing. Gabriel KUCZMAN, PhD.,
Workplace:	Slovak Univerzity of Agriculture in Nitra, Faculty of Horticulture and Landscape Engineering,
	Department of Garden and Landscape Architekture, Slovak Republic
E-mail:	gabriel.kuczman@uniag.sk