

Methodology of compositional assessment in the beech vegetation zone and its application

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Abstract

ZAMRZLOVÁ I., DOLEŽELOVÁ D., VACEK O. (2015): **Methodology of compositional assessment in the beech vegetation zone and its application.** Hort. Sci. (Prague), 42: 159–166.

The visual impact of primary landscape is overwritten, historical references and spiritual ties to the current local population are losing. Rational planning and evaluation of the landscape must correspond to this situation. In the Czech Republic methodologies of landscape assessment (for its identification, typology) exist, but there is no finalizing material to specify procedures for creating landscape designs in accordance with a particular landscape type or vegetation zone. As a response, the new methodology of compositional preconditions assessment in the beech vegetation zone and the model etalon applying generally valid compositional principles on landscape designs were created. In a verification study the new methodology was applied in a specific micro region association – the Svidník. For the worst evaluated units proposals according to the model etalon has been prepared to highlight the characteristics of the appropriate vegetation zone.

Keywords: visual impact of landscape; landscape designs; compositional principles in landscape planning

At present, there is almost no landscape unaffected by human activities (FORMAN, GORDON 1986). Along with changes in behaviour of society different impacts on the landscape are visible (BELL 1999; SÁDLO et al. 2008); related to this are increasing needs for landscape management to ensure its sustainable development (WEBER 2007).

For an effective landscape planning it is firstly necessary to define values and characteristics of the landscape types – for the needs of this thesis altitudinal vegetation zone is understood as a “type”. The work is especially focused on beech vegetation zone. According to ZLATNÍK (1956) this zone represents 50.1% of the Czech Republic (hereafter CR), in altitudes from 400 to 700 m a.s.l., dominant geo-biocoenosis being beech woodland. Based on CULEK et al. (1995) beech vegetation area is slightly smaller – 42.6% of the country. Contrary to these,

ŠTYKAR (2008) involves almost the entire territory of the CR to the natural range of *Fagus sylvatica* L. Beech vegetation zone thus forms one of the basic constituents of the landscape in the CR and was chosen as a model for creation of the methodology of landscape compositional preconditions assessment with respect to the visual character of the landscape type.

In a global scale, especially methodologies focused on the landscape character assessment are currently being processed to ensure the preservation of landscape values, whereas in the past the emphasis was put on biophysical, economic and ecological parameters. Recently, the aspects have been shifted to the foreground that are important for defining a specific identity of place, spiritual dimension (LUGINBÜHL 2006), satisfaction of population with the landscape (BOQUÉ, SALA 2006), etc.

HEPBURN (1984) also says that the aesthetic perception of nature has an effect on the creation of human standards of beauty. This proves the need to include a visual and aesthetic impact of landscape on viewer to complex landscape modifications.

METHODS

The newly established methodology is based on the methods recommended by the Nature Conservation Agency of the Czech Republic for landscape character assessment and generally used categories for landscape character assessment in the European Union (methodologies mentioned by WASCHER (2005)). In accordance with these the new methodology is proceeded in logical steps: 1 – connection to broader territorial units, 2 – definition of solved spaces, 3 – evaluation of the compartments and 4 – the draft measure according to the model etalon. The last step represents a finalizing material for landscape proposals which is currently lacking in the Czech Republic.

Compliance with higher planning levels within the methodology is ensured by the main compositional axes (natural or cultural) that connect the solved micro region or cadastral municipality to the neighbouring territorial units. Compositional axes are supposed to be part of the planning analytical materials. The cultural axis links important cultural monuments and ensures that the region is passable, natural axis creates a set of natural habitat, connecting existing protected areas or elements, territorial system of the ecological stability (TSES), etc.

As a basic component for assessment compositional units are delimited, defined by visual barriers in the area (natural and anthropogenic) and inner homogeneity. Inside the compositional units visual relationships of landscape elements are assessed. The relevant elements are defined from a compari-

son of the above-mentioned methodologies. The most common visually assessed elements are: relief, water features, urban structure, land use (mosaic), vegetation, cultural and natural monuments. BUKÁČEK and CULEK (2009) define the spatial and functional relations for the evaluated elements. VOREL and SKLENIČKA (2004) add time dimension – past and present – to the relations. Relations between elements and their character determined the compositional potential of the assessed zones. In the new methodology the elements are specified to: relief, water features, urban structure, land use and landscape mosaic, configuration of vegetation elements in the landscape, the species composition of vegetation elements, protected areas and natural monuments, dominants and architectural elements in the landscape, cultural monuments, and scenery.

By photographic documentation made in beech vegetation zone (defined by potential natural vegetation and confronted with natural habitats in the CR) typical characteristics of preferred elements within the chosen zone were obtained. On this basis, an evaluation table that assesses eight basic elements (categories) in 5 in detail described levels was created (I) – the most typical, 5 points, (V) – lacking the characteristics of the vegetation zone, 1 point. Table 1 shows descriptions of levels for a relief category.

In total, it is possible to assign 40 points (8 categories per 5 points) for each unit. In case that any of the category cannot be assessed in the compositional unit (e.g. there is no water element) the value is supplemented with the average result for the category in the whole studied territory mathematically rounded to whole numbers.

Final assessment of compositional units:

Group I – 40 to 36 points (at least 90% of maximum) – areas of valuable and relevant characteristics of beech vegetation zone in most categories. Areas particularly suitable for foundation of

Table 1. Example of level description of characteristics for a category relief

Level I. (5 points)	Level II. (4 points)	Level III. (3 points)	Level IV. (2 points)	Level V. (1 point)
visually dominant, in the space creates a distinctive characteristic, mostly jagged uplands (altitude difference range 150–300 m) or flat uplands, hilly area, for herb-rich beech woodlands even highlands	visually rather dominant, other visual stimuli (e.g. vegetation) can overshadow it, prevails uplands and hilly area but rather their flat variant	visually neutral, dominants in the space are created by another characteristics	featureless, not rugged, from a visual point of view does not play a significant role	unimpressed overall image of the topography is not perceived

national parks and significant landscape components and designing educational trails.

Group II – 35 to 28 points (at least 70% of maximum) – areas with the majority of categories in corresponding parameters for the beech vegetation zone. Interventions are not a necessity. Planned modifications focused on those categories that obtained the least points. The territory has a potential to fully match the characteristics of beech vegetation zone after minor interventions.

Group III – 27 to 20 points (at least 50% of the maximum) – areas of average value in terms of compositional parameters of beech vegetation zone. In the categories that received more than half of possible points, adjustments are not immediately needed. Categories that are below this limit are necessary to modify according to the model etalon.

Group IV – 19 to 0 points (less than 50% of maximum) – areas do not match the characteristics of beech vegetation zone. Here, landscape modifications in accordance to the model etalon are a necessity for the most categories.

The results of evaluation (texts and maps) are conceived as part of local plans. In the map each group is coded with different colour – this representation allows a quick overview of compositional potential confronted with the intentions in the territory and makes it easier to decide where to finance and finalize the landscape modifications is necessity and where maintenance or even no interventions can be considered as appropriate approach.

As a finalizing material the model etalon was created, which lists the use of general compositional principles for specific proposals of individual elements modifications according to the character of the beech vegetation zone. On this basis it is possible to draw up concrete proposals for the particular compositional units that are precisely targeted to the problematic category and can change inadequate characteristics to the desired form.

RESULTS AND DISCUSSION

For verification of the new methodology a concrete bioregion was chosen (CULEK et al. 1996) characterized by the same vegetation zone and mostly also by potential biota – suitable for the methodology) with a wider representation of bio-

chores (means more than average, ensures a diversity in compositional units). As the most suitable the Pelhřimov bioregion was chosen and therein due to the size and functionality of the political units the Svidník micro region association. The Svidník association (the largest settlement is Černovice, located between the towns Pelhřimov and Tábor, situated in the Bohemian-Moravian Highlands) is active and functional and there is evident effort to take care and to ensure further development of the landscape, which is important for the possibility of promoting the proposed measures.

The main natural compositional axes indicate a potential connection of 3 natural monuments presented in the micro region. The emphasis in the proposals for units which this axis goes through is put on ecology and biodiversity. The main cultural axis interconnects by proposed system of hiking trails cultural centres of micro region (Černovice, Obrataň, Věžná and Křeč) with historical and cultural monuments beyond boundaries of the solved micro region. Act No. 183:2006, on zoning and building code (Building Act), as amended, defines the tools for urban planning. Planning analytical materials were proved in the verification study as a useful source of information at the micro region scale and for the incorporation of the main compositional axes as results of the methodology.

In accordance to Decree No. 500:2006, on analytical materials for town planning, town planning documentation and method for filing town planning activities, as amended, MÍČHAL et al. (1999) defines a place and region of landscape character before actual assessment of the landscape. Löw and MÍČHAL (2003) specify space according to the visual aspects and hierarchy as inner- and superior visual units. Also the other authors (VOREL, SKLENIČKA 2004) agree on the necessity of relevant landscape spaces delimitation before the assessment. The created methodology corresponds the most to the visual character of units' definition that provides to be the most suitable for the needs of compositional evaluation of the territory.

Based on a field survey visual boundaries throughout the micro region were defined (mostly made up by relief, in minority with anthropogenic origin). By the boundaries 42 compositional units marked with the letters from A–N have been identified (Fig. 1). For the assessment 25 suitable compositional units were selected (fully included in the micro region, belonging to the desired zone defined

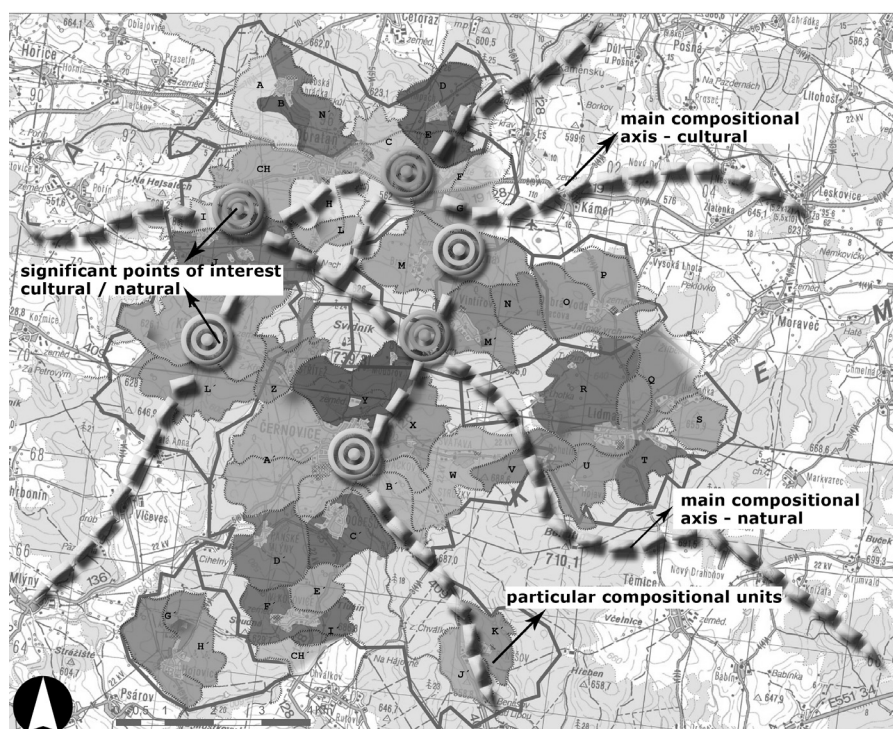


Fig. 1. Main natural and cultural compositional axis and delimitation of compositional units by visual barriers

by potential vegetation). The results are summarized in Table 2. Text and map results of the units' evaluation are compatible with the extent and scale of local plans.

In the first group (the best evaluated areas) only 2 units (J and Y) were placed. The units convincingly fulfil characteristics of beech vegetation zone. That corresponds to BUKÁČEK et al. (2008) who men-



Fig. 2. The form of compositional unit J. The overall structure is composed by preserved scattered vegetation, the scale is pleasant and there are both cultural and natural values

Table 2. Evaluation of compositional units in the solved micro region

Category/ unit	Relief	Water features	Urban structure	Landscape mosaic	Configu- ration of vegetation elements	Species composition	Dominants and archi- tectural elements	General scenery	Total points	Group
H	3	3	1	3	3	4	3	2	22	III
I	2	1	3*	3	4	2	2	1	17*	IV
J	5	5	5	5	5	4	5	5	39	I
K	3	3	2	3	3	3	4	4	24	II
L	3	1	3*	1	1	3	2	2	16*	IV
M	1	4	2	3	3	3	3	2	21	III
N	2	4	2	3	3	3	1	2	20	III
O	2	3	3	2	2	3	3	3	21	III
P	2	4	2	3	2	3	1	2	19	IV
Q	4	3	4	3	2	4	1	3	24	III
R	5	5	4	4	4	4	4	4	34	II
S	4	2	4	2	2	3	2	3	22	III
T	3	3	3	3	3	3	1	3	22	III
U	4	4	2	4	4	3	2	4	27	III
V	2	1	4	2	2	3	3	2	19	IV
W	3	4	4	2	2	3	1	2	21	III
X	5	1	2	4	3	3	2	4	24	III
Y	5	5	3	5	5	4	4	5	36	I
Z	3	3	5	5	5	4	4	4	33	II
E'	3	1	4	3	3	3	2	2	21	III
I'	3	1	4	3	3	3	2	2	21	III
J'	2	4	4	3	2	2	2	2	21	III
K'	3	4	2	4	4	4	3	4	30	II
M'	4	1	4	5	5	4	4	5	32	II
N'	4	1	4	2	2	2	2	1	18	IV

*category could not have been assessed, utilization of the average value; units – see Fig. 1

tion the need of special protection of the preserved historical land use between Bezděčín and Sudkův Důl (unit J) and a natural valley area with meadows around Černovický stream (unit Y) – described as a part of a region Pacovsko. Fig. 2 illustrates the appearance of the compositional unit J. The relief is rugged, sloping down to the water stream with naturally formed vegetation. There are a few settlements; all have historically preserved silhouette and harmonious transition into the landscape. Compositional unit is richly structured by scattered vegetation into

smaller spaces, which creates an adequate scale. The landscape is full of views, interesting and varied. The species composition of vegetation elements is rather diverse and meets the required specifications. The scenery is closed, graspable and comfortable to human scale. There are also historical and cultural values (elements of rural architecture, water fortress in Sudkův Důl). To the positively evaluated units, elements of nature protection are incorporated based on the Act No. 114:1992 on nature and landscape protection, as amended. As the most suitable seems



Fig. 3. Worst compositional unit – unit P. A structure of the area is simple, empty, consists mainly of arable land, the silhouette of a settlement is disturbed by inappropriate building development

the institute of significant landscape components, which is currently under-exploited according to SALAŠOVÁ (2009).

The second group consists of four units. These units meet the desired characteristics in the most categories. Most of the units (14) fall within the third group - an average value. By using the new methodology it is possible to define more accurately the problematic parts of these units and the proposals can be easily focused on them (elements with the lowest points gained). This will lead to more effective funds spent on landscaping while achieving the maximum effect, which corresponds to MAAS et al. (2012), who claim that due to the continuing crisis the global trend is to focus on proposals cost effectiveness and their sustainability.

Four units have received less than half of the possible points (group IV). These units almost do not indicate the appropriate vegetation zone. Fig. 3 shows one of the worst units – unit P. This unit far less visually corresponds to the desired characteristics. The relief is rather flat. The only watercourse in the unit is artificially modified. A silhouette of

the settlement is disrupted by oversized buildings of an agricultural cooperative. The overwhelming majority of the area consists of arable land, which is not divided by vegetation elements. Unit is deserted and empty, without any visible dominant, historical, architectonic or natural values.

Comparison of the results for all of the units with other authors is not possible, because this methodology is a prototype with unique results. Generally the landscape assessment is focused on wider territories or concrete intentions.

For the “worst” unit the finalizing tool was used – the model etalon. This reacts to the claim of BOUCNÍKOVÁ et al. (2006) that the Czech Republic has an elaborate system of urban planning, where there are many rules and tools that unify the options for protection, planning and land use. Nevertheless there is an obvious lack of finalizing materials for specific landscape modification proposals. According to the model etalon, planting of scattered vegetation with historical continuity is designed for this unit (location in accordance to historic mapping with respect to the present farming) and connec-

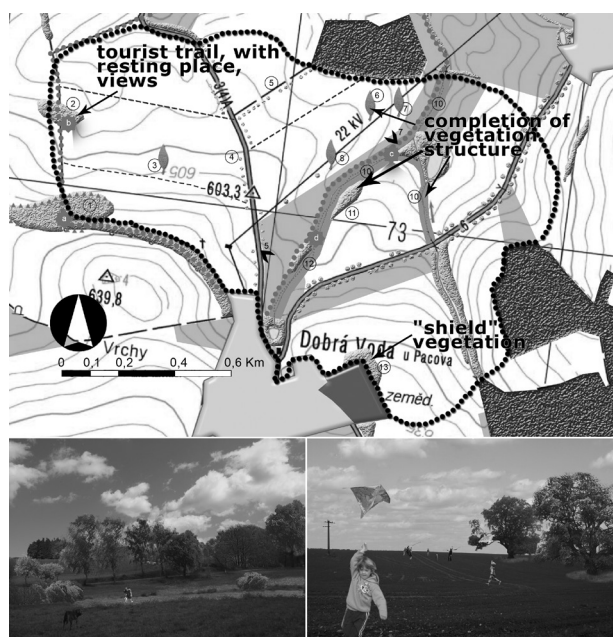


Fig. 4. Scheme of landscape proposals for unit P in accordance with the model etalon – smaller scale of the landscape created by scattered vegetation, revitalization of the stream and “shield” vegetation for smoother transition of the agricultural cooperative to landscape

tion to the local elements of a territorial system of ecological stability (not yet defined in local plans). Hedgerows are designed to highlight verticals by utilization of illusion. Further revitalization of the watercourse is proposed as well as its completion by suitable vegetation. Near the settlement “shield” greenery is complemented around the buildings of an agricultural cooperative to soften and integrate the silhouette. For both vegetation elements principle of repetition is used to incorporate them into the landscape. Species composition in the proposal corresponds to the natural potential vegetation. Vegetation elements provide the division of the compositional unit into smaller spaces, which will be more easily understood and visually more interesting for the viewer. The model also highlights the necessity to combine the functions of proposed elements. In the proposals especially a combination of supplement of scattered vegetation with designing TSES is used, which is consistent with Löw (1995), who points out that planning TSES should also ensure, inter alia: “Socially tolerable form of relationships preservation that existed in the landscape and sustainable development in the countryside should be preserved or restored.” The proposal for unit P is completed by the creation of a tourist

route, which both makes the proposed adjustments available to the visitor and also connects compositional unit with the broader neighbourhood. All the proposed vegetation elements are planned with respect to composition, historical, ecological and economic functions of the landscape. A scheme of the proposed solution is shown in Fig. 4.

CONCLUSION

The connection of the new methodology to the existing process of urban planning is a necessity, therefore it is tied with planning analytical materials (the compositional axis) and local plans (delimitation of the composition units and their evaluation, specification of specially protected areas or elements are planned as part of a regulatory plan extended on landscape). Even now, there is already a base for the need of the methodology, where it would be effortlessly possible to integrate background materials for essential analysis and the results of the compositional potential assessment. In the model area system was this proved to be realistically applicable.

Defining of relevant elements for evaluation based on the used methodologies was also proved as appropriate. The problem is an objective characterization of each level of categories to ensure achievement of the same results when assessing by different experts. Very clear and precise formulations of the scoreboard are essential. The methodology represents a professional tool that requires knowledge of the historical development of the landscape, of the urban structure of settlements, dendrology and phytosociology. The methodology is therefore intended for professionals, landscape architects, who will become an irreplaceable part of the planning process of landscape plans creations.

The results achieved in the model territory correspond to the expectation. The vast majority of compositional units obtained an average score, only a minority group is under the evaluation destined to modification designs according to the model etalon. The model etalon represents at this stage framework instructions for landscaping, which should be further elaborated. It incorporates the generally valid compositional principles to landscaping. This ensures a visual and aesthetic impact of implemented proposals on observers in the landscape.

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Received for publication November 23, 2014

Accepted after corrections March 18, 2015

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