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PERCEPTION OF LANDSCAPE, FOREST AND SETTLEMENT IN PROTECTED LANDSCAPE AREAS

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Abstract

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The paper focuses on perception of landscape, forest and settlement in four Czech protected landscape areas (Kokořínsko, Český Kras, Železné Hory, and Blaník). It studies the relation of perception between the mentioned variables. To study this relation the probability model of logistic regression and Spearman's correlation coefficient are applied. Necessary data for conducted analysis are collected through visitors' (both tourists and residents) survey in studied areas. Data collection was effectuated during summer 2011. The results prove the positive relation between studied variables and are supposed to help to improve economical, ecological and social conditions of these areas.
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protected landscape area, tourism, landscape, forest, settlement, tourist's profile, perception

The main part of landscape perception occurs through the sense of sight and therefore visual impacts of land-use or management activities are important (Tahvanainen *et al.*, 2001). According to Ewald (2001) beautiful landscape plays an important role. The scenic beauty of the landscape affects recreational value since landscape forms the central environment for recreation activities (Karhu and Kellomaki, 1980). There appear many factors affecting the scenic beauty of forest including tree species, forest structure and traces of silviculture practices (Tahvanainen *et al.*, 2001). Many people like sightseeing in the natural environments and it is considered as one of the most popular outdoor recreational activities (Hammit *et al.*,1994). Perception of protected landscape areas by tourists plays important role in rural tourism because a positive or negative attitude to the landscape have an influence on the number of tourists. Protected areas are very attractive settings for the growing demand for outdoor, appreciative activities in natural environments (Eagles *et al.*, 2011).

European landscapes have been subject to change during the last few decades, both physically and perceptually, related to alterations of local ways of life and dissemination of romantic attitudes towards nature (Wang, 2000). A number of studies have found that landscapes that are perceived as natural are considered to be more scenic than cultural landscapes (Ulrich *et al.*, 1991; Kent and Elliot, 1995; Real *et al.*, 2000). According to Norton (1996) little is known about how more or less "ordinary" people perceive the landscapes.

"Landscape" seems to be one of the most important kinds of locations in contemporary non-urban tourism (Jacobsen, 2001). Public preferences of landscape qualities can be examined through verbal questions or through visual presentations. At the same time as landscape qualities are considered crucial for tourism, many tourism-related

environments are undergoing considerable change, making it imperative to explore and identify tourists' landscape perceptions and assessments, in relation to landscape planning, maintenance and restoration as well as tourism development (Jacobsen, 2007).

The paper focuses on perception of landscape, forest, and settlement in the protected landscape areas and solves following research question:

Is there any relation between perception of landscape, forest and settlement?

MATERIALS AND METHODS

Studied areas

For this study there were selected four protected landscape areas (PLAs) in Czech Republic which are situated near the capital Prague – PLA Blaník, PLA Český Kras, PLA Kokořínsko, PLA Železné hory (see Fig.1).

Data collection

The data for further analysis were provided from various resources. The necessary data were collected through respondents' survey conducted in studied protected landscape areas. The respondents included visitors of PLAs, both tourists and residents. Respondents were asked to evaluate the landscape, forest and settlement scaled from –3 (totally dislike) to +3 (totally like). This scale was used from concept of Semantic Differential scale with using some elements of Stapel scale. The survey was conducted in summer 2011 in beforehand given location to ensure the reliability of survey. Respondents were ensured that results would serve for academic purposes. Totally 480 respondents were interviewed.

The geographic data with information about type of land use were used from accessible internet map service of agency Cenia. The ARCIMS address of this map service is http://geoportal.cenia.cz. The analysis was focused on surface calculating area of each type of land use. Maps and layouts were done in program GIS version 9.3 ESRI.

Used methods

The relation of perception of landscape, forest and settlement is analysed by probability model of logistic regression and Spearman's correlation coefficient.

Spearman's correlation coefficient

The relation between perception of landscape, forest and settlement was analysed by Spearman's correlation coefficient (Spearman's rho), which works by first ranking the data, and then applying Pearson's equation to those ranks. The Spearman coefficient is defined as follows:

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)},$$

where d^2 is the sum of the squared differences between the pairs of ranks ($\underline{x} - \underline{y}$), and $\underline{n}$ is the number of pairs. The coefficient runs in the interval <–1; 1>. If = –1 the relation between $\underline{x}$ and $\underline{y}$ is perfectly monotone decreasing. If = 0 there is no monotone relation between $\underline{y}$ and y. If = 1 the relation between $\underline{x}$ and $\underline{y}$ is monotone increasing. Values of close to –1 or 1 indicate strong tendency for $\underline{x}$ and $\underline{y}$ to have monotone relationship (increasing or decreasing). Values close to 0 indicate weak relationship.

The relation between variables is tested by two alternative hypotheses. Left-tailed hypothesis which claimed there was monotone decreasing relation between $\underline{x}$ and $\underline{y}$ (one-tailed – lower) and right-tailed alternative hypothesis which claimed there was monotone increasing relation between $\underline{x}$ and $\underline{y}$ (one-tailed – upper) were tested.

Logit model specification

The independent variable in proposed logistic regression is defined as a scale, so ordinal logistic

1: *Location of four PLA's*

regression is applied. The intervals correspond to the scale of respondents perceptions (–3; –2; –1; 1; 2; 3). Responses with 0 (not able to answer) are not computed in the logit model. The dependent variables are categorical and correspond to respondents' perception scaled (–3; –2; –1; 1; 2; 3). The reference category for studied variables is category with evaluation 3 (most beautiful). Three models of logistic regression are developed with the general logit model function determined as:

$$\text{Ln (perception of landscape)} = \alpha + \beta_1 (\text{perception of settlement}) + \beta_2 (\text{perception of forest}) + e$$

$$\text{Ln (perception of forest)} = \alpha + \beta_1 (\text{perception of settlement}) + \beta_2 (\text{perception of landscape}) + e$$

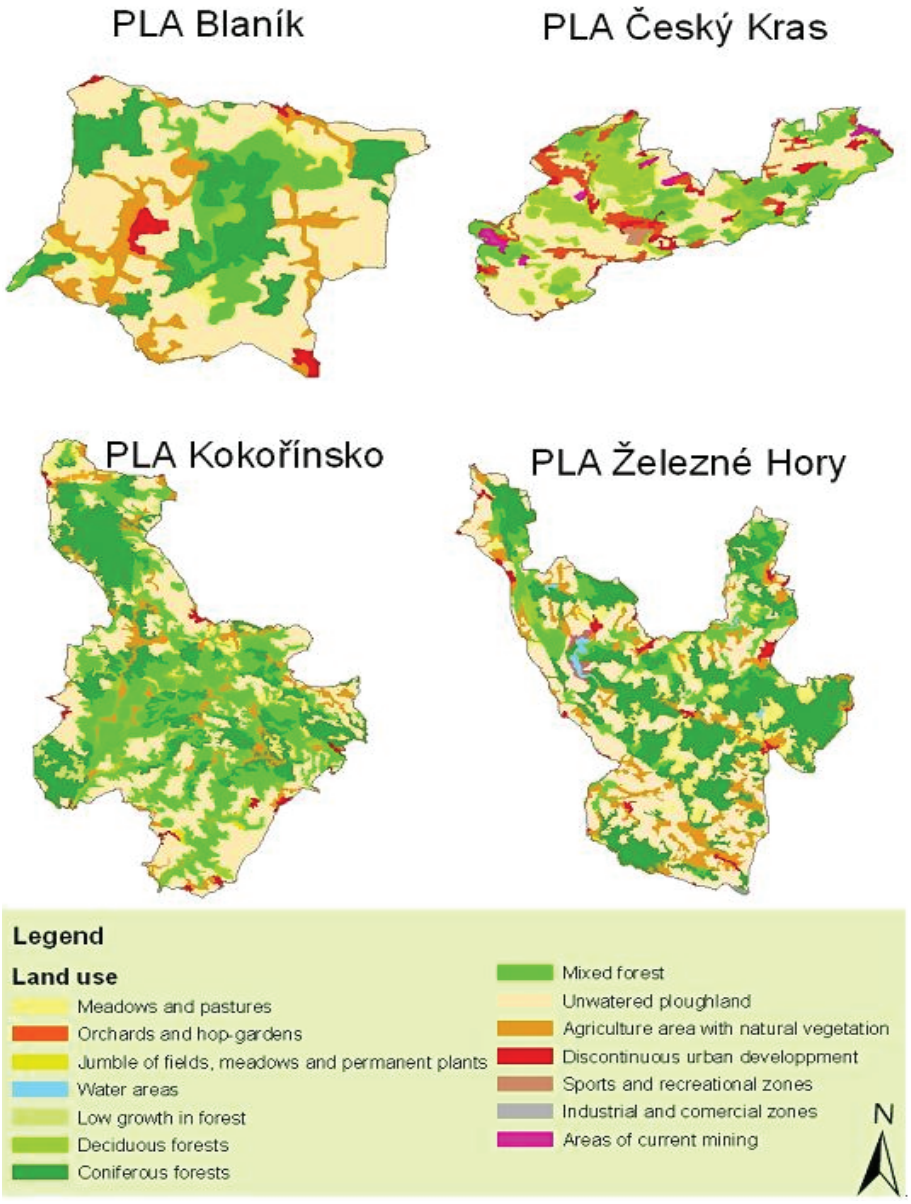
$$\text{Ln (perception of settlement)} = \alpha + \beta_1 (\text{perception of landscape}) + \beta_2 (\text{perception of forest}) + e,$$

where

α .... a constant,

β .... dependent variable coefficient, and e is error term.

The models are test tested by Chi – square test, Cox&Snell R Square and Nagelkerke R Square and McFadden test. Cox & Snell R Square, Nagelkerke R Square and – 2 log likelihood are for guidance only since they can take moderate or low levels, even when the estimated model could be appropriate and useful, due to the fact that the dependent variable is categorical.



2: *Map of landscape, forest and settlement of PLAs*

RESULTS AND DISCUSSION

Type of land use and its distribution in PLA's

There were monitored types of land use in four mentioned PLA's (see fig 2 and appex. 1). PLA Blaník is the smallest one with the surface 40.31 km^2, then it is PLA Český Kras – 132.25 km^2, PLA Kokořínsko 272.66 km^2 and PLA Železné Hory 285.87 km^2. More than 70% of each PLA is formed by forests and unwatered plough lands.

Perception of landscape

The landscape in all analyzed PLA's is perceived as beautiful. Respondents evaluate landscape by the highest grades (2 and 3) in around 90% in all PLAs. The PLA with the landscape perceived as the most beautiful one is Kokořínsko, 92.9% of respondents evaluate landscape by grade 2 and 3. The highest mean (2.45) and standard deviation (0.81) is identified in PLA Kokořínsko, on the other hand the lowest values of that indicators are seen in the PLA Železné Hory.

Perception of settlements

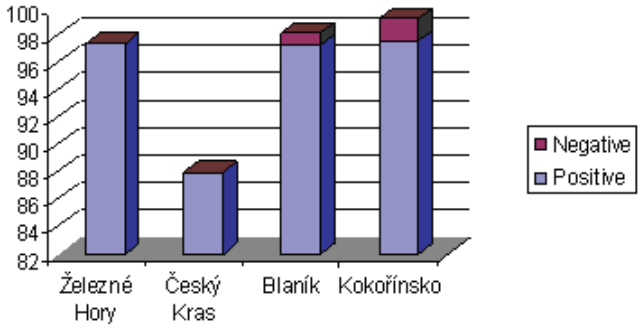
The settlements in all four PLAs are evaluated predominately by grade 2 and 3. Most significant differences in the respondents' perception can be identified in the PLA Kokořínsko (see Fig. 4). In the PLA Kokořínsko there are 81.2% of respondents perceiving settlements positively and 6.2% of respondents negatively. High evaluation of settlements in above mentioned PLA is caused by high percentage of respondents evaluating settlements by grade 3 (20.5%), meanwhile in other PLAs there is the evaluation by the highest grade only around 10.0% in average. Respondents evaluated the settlements in PLAs by grade 2 by 36.1% in average, and by grade 1 by 29.1% in average.

Perception of forests

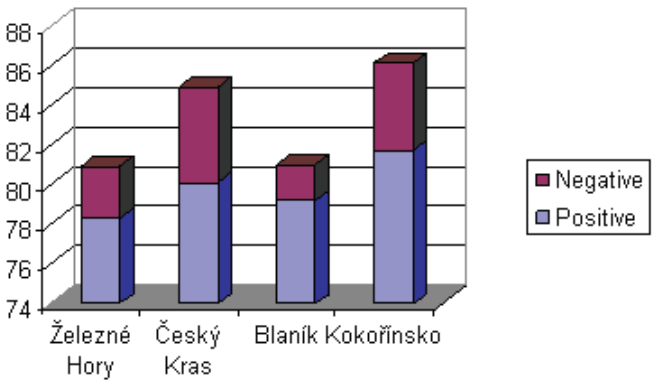
Forests in all PLAs are perceived positively, especially in the PLAs Kokořínsko and PLA Blaník in which more than 35% of respondents evaluate forests by the highest grade. Forests in all PLAs are evaluated positively by around 94.1% of respondents. The negative perception is marked only by 1.0% of respondents in studied PLAs, except the PLA Kokořínsko where 6.4% evaluated forests as not beautiful (1.6% evaluated forest by the lowest grade –3). The highest values of mean (2.12) and standard deviation (0.85) are indicated in PLA Blanik, meanwhile the lowest values are in PLA Český Kras.

Perception of landscape, settlement and forest in studied PLA's

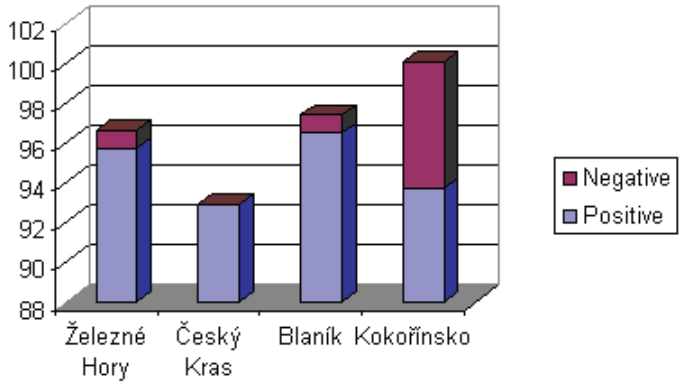
Landscape is perceived as really beautiful (graded by 3). Around one half of respondents graded landscape appearance by 3 in all studied PLAs. Around 90% of respondents marked landscape appearance by the grade 2 or 3. Taking into consideration other grades, the perception is



3: *Perception of landscape*



4: *Perception of settlements*



5: *Perception of forest*

I: *Perception of landscape, establishment, forest (%)*

	–3	–2	–1	0	1	2	3
landscape	0	0.2	0.6	1.6	8.3	36.2	53.1
establishment	0	1	2.8	16	2.9	36.4	14
Forest	0.6	1.4	0.6	4.2	20.4	39.5	33.3

II: *Correlation between the perceived variables*

Correlations					
			Landscape	**Settlement**	**Forest**
Spearman's rho	Landscape	Correlation Coefficient	1.000	.360**	.404**
		Sig. (2-tailed)	.	.000	.000
		N	480	477	480
	Settlement	Correlation Coefficient	.360**	1,000	.255**
		Sig. (2-tailed)	.000	.	.000
		N	477	478	478
	Forest	Correlation Coefficient	.404**	.255**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	480	478	481

the same in all PLAs. The forest is also perceived as beautiful, mostly graded by 2. The strongest perception as beautiful (grades 2; 3) is identified in the PLA Blaník (81.7%) followed by Železné Hory (72.5%), Český Kras (66.9%) and Kokořínsko (60.8%). The highest dispersion can be seen in perceiving establishments, graded mostly by 2. For other evaluation see Tab. I.

The Spearman's correlation coefficient proved the significant mutual correlation between perception of landscape, settlements and forest (see Tab. II). The correlation between these variables is positive and significant at the level 0.01. The strongest relation is seen between perception of landscape and forest. The weakest relation is determined between forest and settlement.

Logit model of landscape

All parameters in designed model are statistically significant. The results prove that people perceiving settlement as the most beautiful (grade 3) are 1.11 times more likely to perceive landscape by one grade more beautiful (less ugly) than people perceiving settlement by grade 2, and people perceiving settlement by grade 1. The probability that people perceiving settlement as the most beautiful perceive landscape by one grade more beautiful than people perceiving settlement as ugly is 50:50. Therefore no strong relation can be identified.

Similarly, no strong relation can be determined between perceiving landscape by one more grade more beautiful by people perceiving forest as the most beautiful comparing to those perceiving forest as ugly. The results prove that people perceiving forest as the most beautiful (grade 3) are 1.45 times more likely to perceive landscape by one grade more beautiful than people perceiving settlement by grade 2, and 1.15 times more likely than people perceiving forest by grade 1.

III: *Logit model of landscape*

		Estimate	Sig.
Threshold	Precetion of lansdcape (–1)	–9,207	,000
	Precetion of lansdcape (–2)	–8,676	,000
	Precetion of lansdcape (–3)	–7,689	,000
	Precetion of lansdcape (1)	–5,951	,000
	Precetion of lansdcape (2)	–3,448	,000
Location	Perception of settlement (–3)	–4,871	,000
	Perception of settlement (–2)	–3,707	,000
	Perception of settlement (–1)	–3,131	,000
	Perception of settlement (1)	–2,368	,000
	Perception of settlement (2)	–2,244	,000
	Perception of forest (–3)	–3,336	,000
	Perception of forest (–2)	–2,824	,047
	Perception of forest (–1)	–2,416	,000
	Perception of forest (1)	–2,036	,000
	Perception of forest (2)	–1,166	,000

Pseudo R-Square
Cox and Snell ,316
Nagelkerke ,358
McFadden ,178

IV: *Logit model of forest*

		Estimate	Sig.
Threshold	Perception of forest (–3)	–6,223	,000
	Perception of forest (–2)	–5,931	,000
	Perception of forest (–1)	–4,517	,000
	Perception of forest (1)	–2,730	,000
	Perception of forest (2)	–0,703	,009
Location	Precetion of lansdcape (–1)	–24,990	
	Precetion of lansdcape (–2)	–5,894	,000
	Precetion of lansdcape (–3)	–3,325	,000
	Precetion of lansdcape (1)	–1,781	,000
	Precetion of lansdcape (2)	–1,187	,000
	Perception of settlement (–3)	–,396	,672
	Perception of settlement (–2)	–1,100	,061
	Perception of settlement (–1)	–,982	,007
	Perception of settlement (1)	–1,143	,000
	Perception of settlement (2)	–,727	,021

Pseudo R-Square
Cox and Snell ,278
Nagelkerke ,298
McFadden ,122

Logit model of forest

The designed model show statistically significant parameters of parameter of landscape perception. The negative coefficients show that respondents perceiving landscape as the most beautiful are more likely to perceive the forest by one more grade more beautiful than people perceiving forest less beautiful.

The results of designed model proved that people perceiving settlement as the most beautiful are more 1.46 times more likely to evaluate the beauty of forest by higher grade than people evaluating settlement by grade 1, and 1.59 times more likely than people evaluating settlement by grade –1.

Logit model of settlement

The results of developed model show that respondents perceiving forest as the most beautiful are 1.87 times more likely to perceive settlement as more beautiful by one grade than people evaluating

V: *Logit model of settlement*

		Estimate	Sig.
Threshold	Perception of settlement (–3)	–5,331	,000
	Perception of settlement (–2)	–4,306	,000
	Perception of settlement (–1)	–2,547	,000
	Perception of settlement (1)	–1,028	,000
	Perception of settlement (2)	1,082	,000
Location	Perception of forest (–3)	–1,807	,089
	Perception of forest (–2)	,188	,886
	Perception of forest (–1)	–,599	,173
	Perception of forest (1)	–,590	,024
	Perception of forest (2)	–,761	,000
	Precetion of lansdcape (–1)	–,417	,844
	Precetion of lansdcape (–2)	–,741	,654
	Precetion of lansdcape (–3)	–3,165	,000
	Precetion of lansdcape (1)	–1,577	,000
	Precetion of lansdcape (2)	–,925	,000

Pseudo R-Square
Cox and Snell ,218
Nagelkerke ,229
McFadden ,082

the beauty of forest by grade 2, and 2.24 more likely than people evaluating the beauty of forest by grade 1. People perceiving landscape as the most beautiful are 1.65 times more likely to perceive settlement as more beautiful by one grade than people evaluating the beauty of landscape by grade 2, and 1.26 times more likely than people evaluating the beauty of landscape by grade 1.

CONCLUSION

The perception of landscape has changed during the time. In general, there may be distinguished two basic perceptions of landscape. The first one is a classical perspective, in which the view is taken that the creation of livable and usable space, such as urban areas, is a mark of civilization and progress. The second approach is the romanticism, in which untouched space has the greatest value, and wilderness assumes a deep spiritual significance (Holden 2008). The research deals with protected landscape areas which are the ones of the most valuable natural places in these days.

The Spearman's correlation coefficient proved the significant mutual correlation between perception of landscape, settlements and forest. The models of logistic regression reveals the probabilities in which people visiting PLAs perceive studied variable. Designed models reveal no strong relation between most of studied variable because the exp(β) coefficients are close to 1. However some stronger relations can be also seen. Respondents perceiving forest as the most beautiful are 1.45 times more likely to perceive landscape by one grade more beautiful than respondents perceiving settlement by grade 2, and 1.15 times more likely than people perceiving forest by grade 1. Respondents perceiving settlement as the most beautiful are more 1.46 times more likely to evaluate the beauty of forest by higher grade than respondents evaluating settlement by grade 1, and 1.59 times more likely than people evaluating settlement by grade –1. People perceiving landscape as the most beautiful are 1.65 times more likely to perceive settlement as more beautiful by one grade than people evaluating the beauty of landscape by grade 2, and 1.26 times more likely than people evaluating the beauty of landscape by grade 1.These results can serve to Protected landscape area's agencies and other private and public subjects which are interested in improvement of social, ecological and economic conditions of those areas.

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