

THE IMPACT OF TOURISM ON OCCURRENCE OF SELECTED ANIMAL SPECIES IN THE BOHEMIAN FOREST

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Currently, the continuous expansion of urban areas is forcing people to move further into the countryside in search for open space. This results in decreasing of undisturbed natural areas which are slowly disappearing. This imbalance in the market, at least in Central Europe, leads to an increase in number of large protected areas preserved as recreational backgrounds for cities. The objective of this research was to assess the impact of tourism during one year on the selected fauna in the Bohemian Forest National Park (Šumava in Czech). Based on outdoor research, the stays signs of game were classified as well as particular activities of visitors were specified in the focused area to analyze the impact rate of visitors on the surrounding area.

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JEL Classification: *L83, M1, O1*



INTRODUCTION

The natural environment plays an important role in modern day life in that it provides a place where people can relax and rejuvenate (Mourek, 2003). The Bohemian Forest has a long tradition of recreational use dating back to the 19th century (Moss et al., 1999). The Bohemian Forest has been relatively unaffected by the negative impact of civilization/development and maintains its original beauty, offering people a place to experience Bohemia as it was thousands of years ago. Garrod (1998) says that tourism cannot be always perceived only as a commercial activity without any significant impact on natural and social-cultural environment into which it is situated. The high-impact travel industry does not respect the social-cultural effects and negative impact on the environment. The minimum-impact travel industry's mission is to minimize the effects on the local area natural environment. There are also attempts at implementation of local sources and prevention of their expansion (Pásková and Zelenka, 2002). Recently, we have met with the promotion of ecotourism, and in the Czech Republic, it is understood as responsible use of natural areas. Its objective is to minimize the negative impact of the travel industry on the environment and society. Ecotourism contributes to the financing of protected areas and are a valuable source of income for the local population (Mourek, 2003, Pearce and Douglas. 1992).

The existence of The Bohemian Forest National Park and Protected Landscape Area with accepted local self-governments supported by the "Development Concept of Travel Industry in the Bohemian Forest" provides assumptions for support of such forms of tourism which are regarded as a soft tourism. A relatively large part of the model area of the Bohemian Forest is under the supervision of state authority in the field of landscape protection which partly ensures that forms of tourist usage of the area will remain preserved in compliance with the Plan of Care for the Bohemian Forest National Park and this is in compliance with the integrated tourism (Bartoš et al., 2004). The integrated tourism uses local resources (natural places of interest, cultural-technical and historical landmarks, traditions, etc.) and permanent residents are involved in this local economy as much as possible (Spilanis and Karayiannis, 2009). In fact, this is a development of certain forms of tourism which are in compliance with local culture and life-style. These forms are environmentally-friendly, unlike mass tourism where the area is exploited without any respect to the will and needs of the inhabitants (Cudlínová et al., 2003, Liu, 2003).

The objective of this research is the assessment of the impact of visitation rates to the selected fauna in the Bohemian Forest National Park in selected months of the vegetation season and off-season. Based on the outdoor research the stay signs of game occurring in the focused area have been classified along with the individual activities of visitors. This research was conducted in cooperation with the Bohemian Forest National Park and out of this project; several Master's theses have been made. The principal question was to measure the amount of impact from the park's visitors on the surrounding fauna in the selected focused area.

METHODOLOGY

The focused area for conducting the research was the tourist trail, Zhůří – Turner's Cottage in the central part of the Bohemian Forest and it is 3.5 km long. It is the most preferred trail in the summer months.

Twenty patterns were selected for observation of the impact of tourism on the selected animal species. Each of them was 50x50 meters large. Ten patterns were located along the trail and ten of them were more distant from the trail (approximately up to 200 - 400m). We used the indirect method for observation of signs of animal presence. This method is especially suitable for obtaining an estimated number of big hoofed mammals in low animal population densities. The advantage is that it includes information from a longer time-line, and thus provides a more complex picture of the usage of the focused area. We used footprints, droppings and bite marks on vegetation as signs of animal occurrence. This survey was performed from July 2008 to March 2009.

We have used the Liddle's methodology (1997) for the assessment of the impact of tourism on animals.

RESULTS

The following species were observed: Red Deer (*Cervus elephas L.*), Roe deer (*Capreolus capreolus L.*), European hare (*Lepus europaeus Pall.*) and wild boar (*Sus scrofa L.*). The trail leads through forests with prevailing spruce (*Picea excelsa*), herbal level (*Vaccinium myrtillus*, *Luzula sp.*), and then also mowed meadow (*Trisetum flavescens*, *Anthoxanthum odoratum*).

The specific locations near the trail and far from the trail were assessed

Table 1 Stay signs of the red deer

Stay signs of animals low-* medium -** strong***

<i>Localities along the trail</i>				<i>Localities distant from the trail</i>			
<i>Mont</i>	<i>Dropping</i>	<i>Footprint</i>	<i>Bite</i>	<i>Mont</i>	<i>Dropping</i>	<i>Footprint</i>	<i>Bite</i>
<i>h</i>	<i>s</i>	<i>s</i>	<i>s on tree</i>	<i>h</i>	<i>s</i>	<i>s</i>	<i>s on tree</i>
			<i>s</i>				<i>s</i>
VII		*		VII	***	*	
VIII.		*		VIII.	*	*	
IX.	*	*	*	IX.	*	**	
X.		*		X.	**	**	
XI.	*	*		XI.	*	*	*
XII.				XII.			
I.			*	I.			*
II.				II.			*
III.				III.			

The stay signs of the red deer assessed according to the droppings are categorized as-low (up to 5 droppings), medium 5-10, and strong 10 and more. According to animal footprints, the stay signs up to 10 are considered low, 15 as medium, 15+ as strong. Regarding bite marks on trees, 2 cases are considered low, 2-4 are medium and 4+ are strong.

During the outdoor survey, we found the highest presence of the Red Deer in July and October to be in areas far from the trail. The highest impact along the trail was in September. When the snow levels rose, the population decreased as deer species migrated to lowland regions and used the game preserves for the winter season.

Table 2 Stay signs of the roe deer

*Stay signs of game low- * medium-** strong ****

<i>Localities along the trail</i>				<i>Localities distant from the trail</i>			
<i>Month</i>	<i>Droppings</i>	<i>Footprints</i>	<i>Bites on trees</i>	<i>Month</i>	<i>Droppings</i>	<i>Footprints</i>	<i>Bites on trees</i>
VII	**	**		VII	**	***	
VIII.	**	**		VIII.	*	**	
IX.	*	*		IX.	***	***	
X.	**	**		X.	**	**	
XI.	**	*		XI.	**	**	*
XII.	*		*	XII.		**	*
I.		*		I.			*
II.				II.		*	*
III.		*	*	III.	*	*	*

Regarding droppings we assessed the roe deer's droppings as low (up to 30 droppings), 30-50 as medium and 50+ as strong. The footprints up to 10 are regarded as low, 15 as medium and 15+ as strong. And bites we assessed as follows - 2 cases as low, 2-4 as medium and 4+ as strong.

We have found the roe deer's highest number of footprints and droppings in more distant localities in July, August and October. On the other hand, bite marks were found more in winter months. The cause of the occurrence of bite marks, in majority of cases, is the number of animals, structure of population, capacity of environment, intraspecific and interspecific competition and disturbance. The stress and disturbance may be related not only to high recreational use of landscape, but also to bad hunting practices and when the animals cannot sufficiently satisfy their need for food (grazing cycles) and search for alternative sources of food in calmer localities (e.g. bites of young growth).

Table 3 Stay signs of the European hare

*Stay signs of animals low- * medium- ** strong ****

<i>Localities along the trail</i>				<i>Localities distant from the trail</i>			
<i>Mont h</i>	<i>Droppings s</i>	<i>Footprint s</i>	<i>Bite s on tree s</i>	<i>Mont h</i>	<i>Droppings s</i>	<i>Footprint s</i>	<i>Bite s on tree s</i>
VII	**	*		VII	**	*	
VIII.	*			VIII.	**		
IX.	*			IX.	*		
X.	*			X.	**		
XI.	*			XI.	*		
XII.		*		XII.	*	*	
I.				I.			
II.		*		II.			
III.				III.		*	

Regarding droppings we assessed the European hare's droppings as low (up to 30 droppings), 30-40 as medium and 40+ as strong. The footprints we regarded up to 5 as low, 10 as medium and 15+ as strong.

Regarding the European hare, we found its slightly higher presence in locations more distant from the trail. In the last few decades the number of European hare has been decreasing. The European hare is a very sensitive bioindicator of the environment in the focused locality. Monoculture plants in forestry became completely unpopular for game (especially inner area of larger units). The variety of herbs was reduced, and thus the amount of food available and at the same time the possibility of shelter. A suitable habitat for the European hare depends on many factors such as food availability, shelter and disturbance. Its number is reduced by uncontrolled tourism, the disturbance from animals in the area, less suitable places to reproduce especially in the spring season.

Table 4 Stay signs of the wild boar

*Stay signs of game low- * medium-** high****

<i>Localities along the trail</i>				<i>Localities distant from the trail</i>			
<i>Mont</i>	<i>Dropping</i>	<i>Footprint</i>	<i>Bite</i>	<i>Mont</i>	<i>Dropping</i>	<i>Footprint</i>	<i>Bite</i>
<i>h</i>	<i>s</i>	<i>s</i>	<i>s on tree s</i>	<i>h</i>	<i>s</i>	<i>s</i>	<i>s on tree s</i>
VII	*	*	*	VII	*	*	**
VIII.	*		*	VIII.	*	*	*
IX.	*		*	IX.	*		
X.	*	*		X.	*	*	*
XI.				XI.	*		
XII.	*	*		XII.	*	*	
I.		*	*	I.		*	
II.			*	II.			*
III.				III.			

Regarding the wild boar's droppings we assessed it as low (up to 5 droppings), (5-10 droppings) as medium, and (10+droppings) as strong. The footprints we regarded up to 5 as low, 10 as medium and 15+ as strong.

Tourist Industry's Burden

Tourism and related recreational activities cause serious types of disturbances to animals. The seriousness is expressed by an easy scale between 0-5, meaning 0 = zero, insignificant type of disturbance, 1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high (type of animals' disturbance). The level of impact for our observed locality is assessed as a total breach of peace and quiet (1) and seriousness of disturbance of animals is assessed as low (2). We concluded that cycling (Dvorakova, 2006) has the most significant impact on game. In our case we could see cycling activity in the upper part of the trail near Zhůří despite the fact that it is prohibited there. Taylor and Knight (2003) were searching in

their study for the mutual impact of game and trail users (hikers and cyclists). They note that cyclists, during equivalent time frames, cover much longer distances than hikers, disturbing a higher number of wild animals.

CONCLUSION

On average, we registered the visitor rate between 30-60 tourists per day in nice weather and during holidays. The individual activities of visitors were hiking, hiking with a dog, harvest of forest fruit and mushrooming, and in the part of the trail called "Hluboká" also cycling and cross-country skiing. In the off-season the trail was not used, mainly because of the high level of snow from November to March and impossibility to keep the snow off the trail. The trail is intended especially for hiking, and cycling is prohibited there. In the growing season during the summer holidays (July, August) a higher concentration of animals, especially the red deer and the roe deer, was recorded in more distant locations. The total impact of tourism on our selected animal species has not been significant yet. On a scale based on vulnerability, we would classify it at a slightly negative level and specifically in the upper part of the trail from Zhůří, where cyclists appeared despite the ban. We have assessed the impact of visitors as low and it does not endanger the ecological sustainability of the study area.

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