

# DO VISITORS TO THE JIZERA MOUNTAINS PLA BEHAVE SUSTAINABLY? COMPARISON OF THE SUMMER AND WINTER SEASONS

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## Abstract

The paper presents results of research focused on sustainability of behaviour of tourists and visitors of the Jizera Mountains Protected Landscape Area. It builds on a sociological survey conducted on a representative sample of 733 tourists from Czechia and foreign visitors using CAPI in August 2021 and January 2022.

Our paper focuses on the analysis of mobility behaviour and selected activities in the protected area and potential for behaviour change in favour of more sustainable alternatives, including choice of means of transport to and around the territory, various services and activities in the area, and impacts of selected measures on the behaviour change; furthermore, differences between summer and winter seasons are compared. The paper also provides data on respondents' awareness regarding local specifics and possible activities and mobility services in the area.

The presented research results are a part of comprehensive research to develop guidelines for the so-called "Mobility plans for environmentally sensitive areas (ESAs)". Mobility plans should help authorities conceptually develop more sustainable forms of tourism and thus alleviate the pressure on the environment and its protection as such while respecting the specifics of the protected areas in Czechia.

**Key words:** Large-scale environmentally protected areas, sustainable tourism, sustainable mobility

## Introduction

Large protected areas, in our view Protected Landscape areas (PLAs) and National Parks (NPs), have long faced growing numbers of visitors. The increasing numbers of visitors to protected areas bring pressure to provide basic infrastructure and services (transport, catering, accommodation, information services) and negative impacts on the environment and local communities (Drápela et al., 2021).

Transport is necessary to ensure the mobility of locals and visitors, but at the same time, it causes various external costs (Brůhová Foltýnová, 2008). Reducing external transport costs should therefore be a key objective in the further development of large protected areas. The present article finds out how visitors to the Jizera Mountains PLA come to this area, how they move around it and what they do in the area and the possibilities of developing more environmentally friendly modes of transport. The research aims to further describe the users of main transport modes (car, bus, train) and potential differences between the summer and winter seasons.

## Materials and methods

The main source of data is a sociological survey, which took place in the Jizera Mountains in two waves in the form of CAPI: from 10 to 30 August 2021 and from 13 to 25 January 2022. The data collection was carried out by a professional sociological agency. The sample was created using quota selection, where quotas were set for age, gender, domestic vs. foreign visitors, one-day vs. multi-day stays, and weekdays vs. working days. These quotas were set on the basis of previous surveys of visitors to these areas. The obtained data were checked in terms of the requirement for completeness and logical consistency of the information obtained. A total of 733 correctly completed and logically consistent questionnaires were obtained, of which 355 came from the summer collection and 378 were from the winter wave. The structure of the sample is summarized in Table 1.

## Results

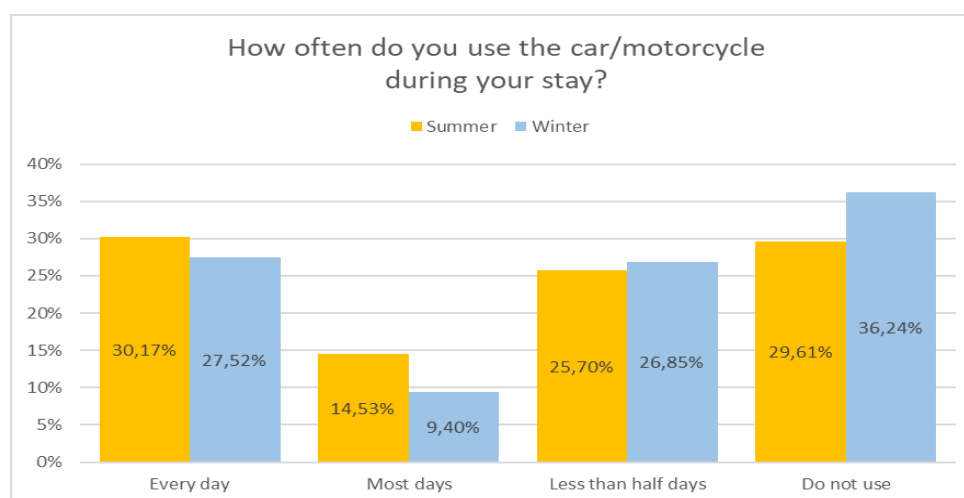
The results of the analysis show that the dominant means of transport used by visitors is the passenger car. About 75% of the respondents come to the area by car, in both winter and summer. Most respondents park in paid or unpaid parking lots (87% in total), with more than 80% of them finding a free parking space in both winter and summer where they planned it without searching. The frequency of using one's own car during a multi-day stay is not very different in summer and winter, even though slightly more people use a different type of mobility in winter (see Graph 1). Overall, in both periods, 29% of the respondents who stay more days use their car to move within the stay on

average every day, 26% for most days, 26% for less than half of the days and 33% of the respondents move differently than by car or motorcycle during their stay.

Tab. 1: Sample description

	Summer		Winter		Total	
	N	%	N	%	N	%
<b>Survey wave</b>	355	48.43	378	51.57	733	100.00
<b>Aged 15-29*</b>	69	9.41	54	7.37	123	16.78
<b>Aged 30-44*</b>	132	18.01	127	17.33	259	35.33
<b>Aged 45-59*</b>	98	13.37	128	17.46	226	30.83
<b>Aged 60 and over*</b>	56	7.64	69	9.41	125	17.05
<b>Tourists (overnighting)*</b>	230	31.38	168	22.92	398	54.30
<b>Day-trippers (not overnighting)*</b>	125	17.05	210	28.65	335	45.70
<b>Asked on weekdays*</b>	193	26.33	211	28.79	404	55.12
<b>Asked on Sat, Sun, public holidays*</b>	162	22.10	167	22.78	329	44.88
<b>Male*</b>	173	23.60	194	26.47	367	50.07
<b>Female*</b>	182	24.83	184	25.10	366	49.93
<b>Domestic visitors*</b>	326	44.47	353	48.16	679	92.63
<b>Foreign visitors*</b>	29	3.96	25	3.41	54	7.37
<b>Arrived alone</b>	60	8.19	90	12.28	150	20.46
<b>Arrived with spouse/partner</b>	81	11.05	72	9.82	153	20.87
<b>Arrived with friends</b>	56	7.64	93	12.69	149	20.33
<b>Arrived with family with children</b>	152	20.73	108	14.73	260	35.47
<b>Arrived with group (package tour)</b>	6	0.82	15	2.05	21	2.86
<b>Occupation:</b>						
<b>Employee</b>	209	28.51	234	31.92	443	60.44
<b>Self-employed</b>	46	6.28	50	6.82	96	13.10
<b>Pensioner (not working)</b>	48	6.55	46	6.28	94	12.82
<b>Homemaker/parental leave</b>	24	3.27	14	1.91	38	5.18
<b>Student/pupil/apprentice</b>	21	2.86	28	3.82	49	6.68
<b>Others</b>	7	0.95	6	0.82	13	1.77
<b>Household income: Below-average</b>	10	1.36	7	0.95	17	2.32
<b>Household income: Roughly average</b>	238	32.47	241	32.88	479	65.35
<b>Household income: Above-average</b>	79	10.78	93	12.69	172	23.47
<b>Household income: Not stated</b>	28	3.82	37	5.05	65	8.87
<b>Education: Primary, apprentice</b>	78	12.01	62	8.45	150	20.46
<b>Education: Secondary, leaving exam</b>	131	17.87	119	16.23	250	34.11
<b>Education: College, university</b>	136	18.55	197	26.88	333	45.43

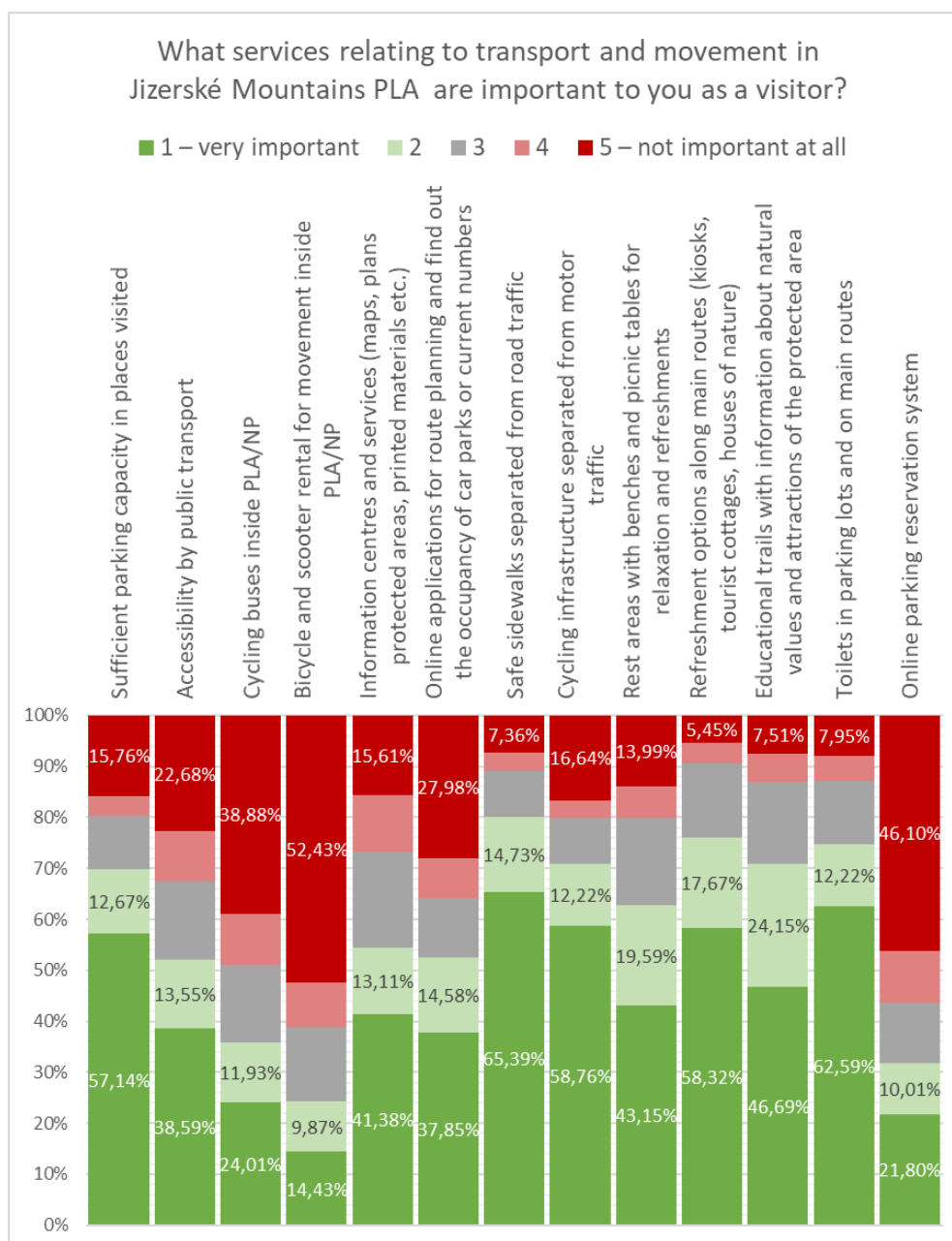
\* set quotas for survey



Graph 1: Territorial mobility for multi-day stays

## Services

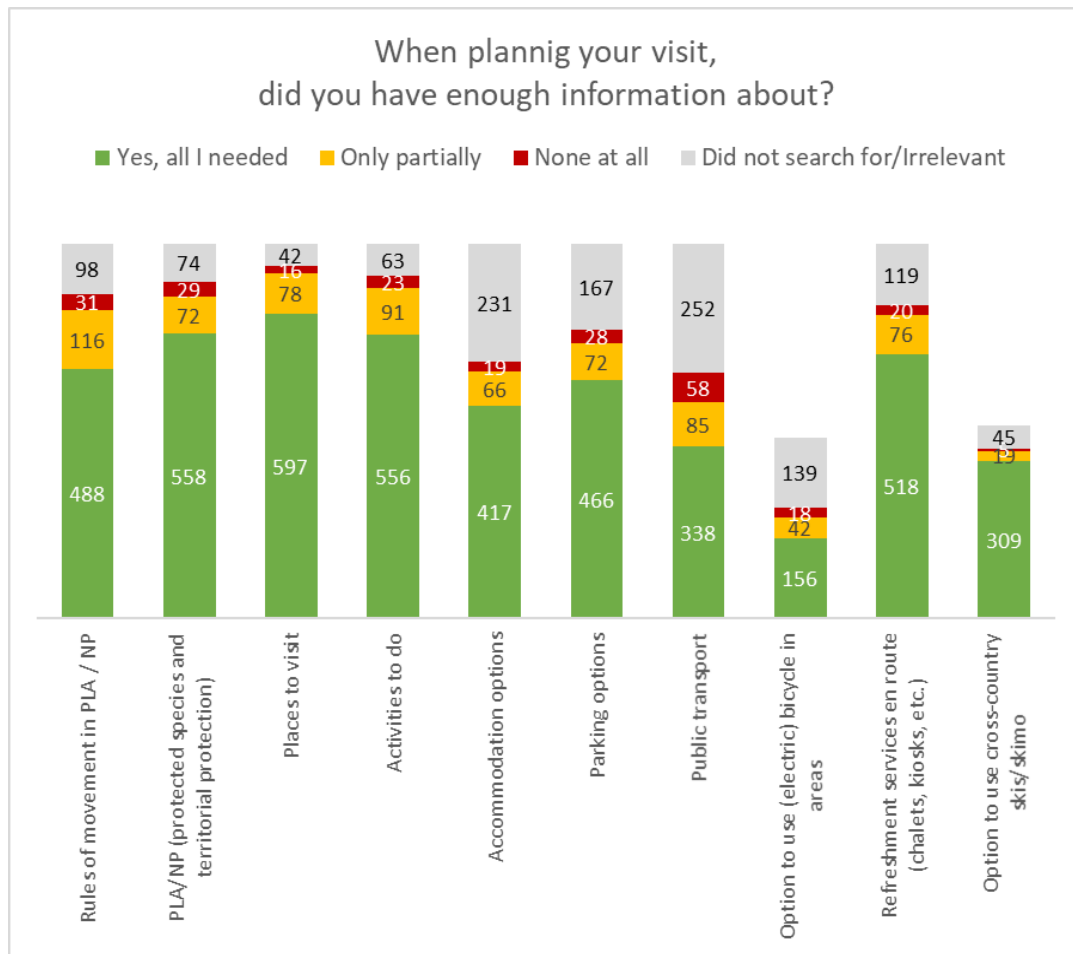
High-quality infrastructure appears to be important for tourists (especially safe sidewalks separated from road traffic – important for 80% of respondents, respectively cycling infrastructure separated from motor traffic – 71%), as well as the provision of toilets in car parks and along main routes (75%) and the possibility of refreshments on the main tourist paths (74%). Respondents also consider sufficient parking capacity in the places they visit (70%) to be important. On the other hand, respondents consider the possibility of renting bicycles or scooters to move within the territory (61% of the respondents) and an online parking reservation system (56%) to be unimportant; see Chart 2. The greater differences between summer and winter periods are caused by natural differences between these periods, which causes respondents to be more aware of the importance of sufficient parking capacity, toilets in car parks and on main routes or an online parking reservation system during winter.



Graph 2: Perception of transport-related services in terms of their importance

## Visitors' awareness

Graph 3 shows that the respondents have most of the necessary information available when visiting the Jizera Mountains PLA. They search less for information about public transport and accommodation options, as some of them do not use these services. The satisfaction does not differ between winter and summer substantially.



Graph 3: Use of information by visitors

For further regulation and planning of transport, it is important to find out who uses different modes of transport to come to the PLA territory. To answer this question, a multidimensional linear regression is used, in which the dependent variables are currently used transport modes. Socio-demographic characteristics, as well as on with whom the respondent travels, the length of stay and interests in hiking or cycling enter the model as independent variables. Their list is given in Table 2.

Tab. 2: List of variables entering multidimensional linear regression

<b>Car</b>	car = 1; otherwise = 0
<b>Train</b>	train = 1; otherwise = 0
<b>Bus (regular service)</b>	bus = 1; otherwise = 0
<b>Day asked</b>	weekday = 1, weekend = 2
<b>Domestic/foreign visitor</b>	domestic = 1, foreign = 2
<b>Length of stay</b>	1 day = 1, 1-2 overnights = 2, 3-7 overnights = 3, longer = 4
<b>Arrived with family</b>	with family = 1; otherwise = 0
<b>Arrived alone</b>	alone = 1, otherwise = 0
<b>Arrived with spouse</b>	with spouse = 1, otherwise = 0
<b>Age</b>	15-29 = 1, 30-44 = 2, 45-59 = 3, 60 and over = 4
<b>Gender</b>	male = 1, female = 2
<b>Education</b>	primary = 1, apprentice = 2, secondary without exam = 3, secondary with exam = 4, university = 5
<b>Economically active</b>	active = 1, inactive = 0
<b>Household income</b>	below-average = 1, roughly average = 2, above-average = 3, way above average = 4
<b>Interest in nature</b>	yes = 1, no = 0
<b>Interest in hiking</b>	yes = 1, no = 0
<b>Interest in cycling</b>	yes = 1, no = 0

The results of the regression suggest that the car is used more in summer and winter by those who come for longer stays, as well as people travelling with family or with more people and with an above-average income. In summer, those who are less interested in nature belong here too. In winter, more foreigners, younger men and higher-income men drive a car (see Table 3).

The main factors that explain the choice of the train as a means of transport to visit the Jizera Mountains PLA include gender in the summer – men travel more in this way, as well as those with lower incomes (in addition, the lower the income in the respondent's household, the greater the chance that they come to the area by train), with more interest in nature and less interest in hiking. In winter, these are those who travel alone or without a family.

As Table 3 shows, women and people with lower incomes use the bus more in summer and winter. In addition, in winter, they are visitors from the Czech Republic, travellers without a family or alone and older people. In summer, on the other hand, it is more often those who are more interested in nature, hiking and, conversely, less interested in cycling.

Tab. 3: Regression analysis – factors influencing the choice of car

N	SUMMER			WINTER		
	324			339		
	Coefficient	P-value		Coefficient	P-value	
<b><i>By what transport mode did you arrive from home? CAR / MOTORCYCLE</i></b>						
Day asked	-0.04	0.38		0.05	0.25	
Domestic/foreign visitor	0.02	0.86		0.18	0.04	**
Length of stay	0.08	0.00	***	0.06	0.01	**
Arrived with family	0.17	0.01	**	0.16	0.00	***
Arrived alone	-0.14	0.10	**	-0.24	0.00	***
Arrived with spouse	0.12	0.13		0.08	0.16	
Age	-0.01	0.58		-0.04	0.09	*
Gender	-0.07	0.16		-0.13	0.00	***
Education	0.02	0.32		0.03	0.08	**
Economically active	0.17	0.01	***	0.11	0.03	**
Household income	0.06	0.24		-0.01	0.85	
Interest in nature	-0.13	0.01	***	-0.15	0.08	**
Interest in hiking	0.02	0.70		-0.02	0.72	
Interest in cycling/cross-country skiing	-0.04	0.49		-0.05	0.33	
<b><i>By what transport mode did you arrive from home? TRAIN</i></b>						
Day asked	0.01	0.79		0.03	0.14	
Domestic/foreign visitor	-0.03	0.60		-0.03	0.39	
Length of stay	0.01	0.66		0.01	0.43	
Arrived with family	-0.08	0.14		-0.04	0.06	*
Arrived alone	0.02	0.79		0.04	0.09	*
Arrived with spouse	-0.03	0.60		-0.03	0.16	
Age	0.01	0.64		0.00	0.62	
Gender	0.09	0.02	**	0.01	0.54	
Education	-0.02	0.25		0.00	0.60	
Economically active	-0.08	0.06	*	0.03	0.12	
Household income	-0.06	0.06	*	0.01	0.75	
Interest in nature	0.13	0.00	***	0.02	0.66	
Interest in hiking	-0.07	0.08	*	0.02	0.47	
Interest in cycling/cross-country skiing	-0.05	0.21		-0.01	0.68	
<b><i>By what transport mode did you arrive from home? BUS (REGULAR SERVICE)</i></b>						
Day asked	0.04	0.21		-0.02	0.58	
Domestic/foreign visitor	-0.10	0.10		-0.14	0.08	*
Length of stay	-0.04	0.02	**	-0.09	0.00	***

<b>Arrived with family</b>	-0.06	0.18		-0.14	0.01	***
<b>Arrived alone</b>	-0.03	0.54		0.24	0.00	***
<b>Arrived with spouse</b>	-0.14	0.01	***	-0.09	0.13	
<b>Age</b>	0.01	0.72		0.04	0.05	**
<b>Gender</b>	0.06	0.08	*	0.14	0.00	***
<b>Education</b>	0.02	0.30		-0.03	0.09	*
<b>Economically active</b>	-0.07	0.08	*	-0.11	0.02	**
<b>Household income</b>	-0.04	0.22		-0.01	0.79	
<b>Interest in nature</b>	0.07	0.05	**	0.12	0.15	
<b>Interest in hiking</b>	0.10	0.01	**	0.05	0.33	
<b>Interest in cycling/cross-country skiing</b>	-0.10	0.01	**	0.07	0.12	

**Note:** \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

## Discussion

Respondents expressed great interest in quality infrastructure in the area, especially a separate walking and cycling infrastructure with a sufficient supply of toilets, refreshments and rest areas. This interest was expressed by most respondents, regardless of the means of transport used. However, it was confirmed that visitors to the Jizera Mountains PLA use cars for transport to the area, in both winter and summer, while the use of alternatives to cars is more common among low-income people and single travellers. Public transport users also expressed greater interest in nature. Interestingly, the train is more often chosen by men, while the bus is chosen more by women. There are differences between the summer and winter seasons, especially in the provision of services. In winter, sufficient parking capacity, toilets in the car parks and on the main routes or an online parking reservation system proved to be even more important.

## Conclusion

The results clearly show that visitors use dominantly cars to travel to and around the PLA, especially those travelling with families or other company, higher-income, men and coming for longer stays. Car is also used more by those who cycle in the area. One of the ways to reduce unsustainable travel and movement around the territory is to create products and conditions that will support alternative travel even for higher-income groups, travellers with children, etc.

It is necessary to create an offer of alternative types of transport with a sufficient system for informing visitors about the possibilities of alternatives, their benefits and possible (suitably set) advantages. Sustainable transport modes should be better integrated, cheaper, and should provide direct connection to boarding points with service infrastructure (refreshments, toilets, information panels).

In terms of sustainability and minimization of negative impacts of transport in the area caused by overtourism, multiple public transport boarding points, lines with regular intervals and interconnected with other urban transport (long-distance commuting) or to car parks at the edge or outside of the PLA must be established.

Among the actors who could address such an integrated system in environmentally sensitive areas are the PLA/NP administrations, destination agencies and communication administrations and wider integrated systems – region authorities. Other actors may be local governments, local government associations or other local action groups and organizations.

The presented results are a part of comprehensive research to develop a methodology for the so-called "Mobility Plans for Environmentally Sensitive Areas (ESA)". Mobility plans should help authorities conceptually develop more sustainable forms of tourism, and thus alleviate the pressure on the environment and its protection as such while respecting the specifics of protected areas in the Czech Republic.

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## Souhrn

Příspěvek prezentuje výsledky výzkumu zaměřeného na udržitelné chování turistů a návštěvníků CHKO Jizerské hory. Vychází ze sociologického průzkumu provedeného na reprezentativním vzorku 733 návštěvníků z České republiky a zahraničí pomocí metody CAPI v srpnu 2021 a lednu 2022.

Náš příspěvek se zaměřuje na analýzu mobilitního chování a vybraných aktivit v chráněném území a potenciál pro změnu chování ve prospěch udržitelnějších alternativ, včetně volby dopravního prostředku při příjezdu a pohybu po území, různých služeb a aktivit v území, a dopady vybraných opatření na změnu chování; dále jsou porovnány rozdíly mezi letním a zimním obdobím. Příspěvek také poskytuje údaje o informovanosti respondentů o místních specifikách a možných aktivitách a službách mobility v dané oblasti.

Prezentované výsledky výzkumu jsou součástí komplexního výzkumu s cílem vypracovat metodiku pro tzv. „Plány mobility pro environmentálně citlivé oblasti (ESA)“. Plány mobility by měly úřadům pomoci koncepčně rozvíjet udržitelnější formy cestovního ruchu, a tím zmírnit tlak na životní prostředí a jeho ochranu jako takovou při respektování specifik chráněných území v ČR.

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