

## VISITORS' PERCEPTION OF CROWDING. A CASE STUDY FROM THE TATRA MOUNTAINS

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### Percepcja zatłoczenia w ocenie turystów. Studium przypadku – Tatry

*Zarys treści:* Obszary chronione odgrywają istotną rolę jako atrakcje, przyciągające do roku dużą liczbę turystów. Od ubiegłego stulecia, osoby zarządzające obszarami chronionymi oraz naukowcy starają się wyznaczyć wskaźniki określające maksymalną liczbę turystów, którzy mogą odwiedzić dany obszar bez wywierania dużego wpływu na jego środowisko. W rezultacie tych starań, powstała teoria chłonności turystycznej (Carrying Capacity – CC), która obecnie przekształciła się w koncepcję zwaną Granicami Akceptowalnych Zmian (Limits of Acceptable Changes – LAC). Koncepcja ta opiera się na oczekiwanych warunkach, jakie powinny być zastane na obszarze chronionym zarówno w aspekcie ekologicznym, jak i społecznym. Celem badań jest określenie dopuszczalnego, w ocenie turystów, poziomu zatłoczenia w sąsiedztwie górnych stacji kolejek linowych zlokalizowanych na obszarze Tatr oraz dodatkowo uzyskanie informacji na temat wpływu poszczególnych czynników na różnice w postrzeganiu zatłoczenia przez turystów. Dane ujęte w analizie zgromadzono w ramach dwóch projektów badawczych: w rejonie Kasprowego Wierchu (Polska) oraz Łomnickiego Stawu (Skalnate Pleso, Słowacja). W celu uzyskania informacji na temat postrzegania zatłoczenia przez turystów, przeprowadzono badania ankietowe w sezonie letnim 2014 i 2015 w obu obszarach. Wyniki badań wskazują, że poziom akceptacji zatłoczenia maleje wraz ze wzrostem liczby turystów w obszarach badawczych i jest również zależny od miejsca. Poziom akceptacji zatłoczenia zależy także od innych czynników, tj.: wykształcenie respondentów, rodzaj zakupionego biletu czy wielkość grupy.

*Słowa kluczowe:* obszary chronione, turyści, percepcja zatłoczenia, Tatry

*Abstract:* Protected areas (PAs) serve as significant tourist destinations, drawing a substantial number of visitors annually. Over the past century, managers and scientists overseeing PAs have sought to identify indicators that specify the maximum number of tourists that could visit a particular area without making a large impact on the environment. As a result, the carrying capacity theory was created, which now evolved into the concept called Limits of Acceptable Changes (LAC). This concept is based on the expected conditions that should be met in a protected area in both ecological and social aspects. This study aims to assess the tolerable level of congestion in a cable car destination situated in the Tatra Mountains and, in addition, to obtain information on the factors that affected the differences in visitors' perception of crowding. Data used in the analysis were collected as part of two research projects: focused on the Kasprowy Wierch area (Poland) and the Skalnaté Pleso area (Slovakia). To gain information on the perception of crowding by visitors, on-site surveys were conducted during the summer season of 2014 and 2015 at both sites. The research results show that the acceptance of crowding decreases with the increasing number of visitors in research areas and it is affected by the type of research area. The analysis also reveals that the acceptance of crowding is also dependent on socio-demographic and social factors such as the level of educational attainment of the respondents, the type of trip or the size of the group.

*Keywords:* protected areas, tourists, crowding perception, Tatras

## Introduction

Protected areas (PAs) and especially mountain PAs are considered to be important tourist attractions (Newsome et al. 2002; Buckley 2010; Plummer, Fennel 2009). Therefore, they often attract large numbers of visitors, which poses a significant problem for PAs managers. Especially challenging are easily accessible places such as cable car destinations (Eagles et al. 2002). It should be noted that the COVID-19 pandemic has also caused an increase in interest in active tourism, which takes place in valuable natural areas (Lebrun et al. 2021). In order to reduce the negative impact of tourism on such sensitive ecosystems, four types of limitations are often introduced: (1) spatial, (2) temporal, (3) quantitative and (4) qualitative. Moreover, quantitative limitations are considered to be the most difficult to implement from PAs managers perspective (Eagles et al. 2002; Skawiński 2010; Kohl, Pekny 2011; Jodłowski 2016).

Since the last century, managers of protected areas (PAs), assisted by scientists, have tried to determine the indicators that specify the maximum number of visitors who could visit a particular protected area without causing significant damage of the environment (Cole 2004; Staniewska-Zątek 2007; Zaręba 2010). As a result, the carrying capacity concept was created. This theory originates from the pastoral ecology approach. At first, it referred only to the negative impact of humans on natural ecosystems. However, in 1964 J.A. Wagar also began to consider the social aspect of carrying capacity understood as the level of satisfaction or dissatisfaction with the

large number of visitors in a particular PA (Stankey, McCool 1984; Cole 2004; Sterl et al. 2004; Hausser et al. 2006; Somarriba-Chang, Wallentinus 2012). Currently the EUROPARC Federation therefore distinguishes three types of carrying capacity: (1) ecological, (2) socio-cultural and (3) psychological (social) (Zaręba 2010). However, the carrying capacity theory has been repeatedly criticised by many researchers (McCool, Lime 2001; Cole 2004; Garrigós Simón et al. 2004; Graja-Zwolińska 2009). Establishing a carrying capacity indicator in a particular PA does not solve problems with a high visitor load. Furthermore, the limits are often exceeded (McCool, Lime 2001; Graja-Zwolińska 2009). The Carrying Capacity approach has hence evolved into the concept referred to as Limits of Acceptable Changes (LAC), which is based on the expected conditions that should be met in a protected area from both an ecological and a social perspective (Stankey, McCool 1984; McCool, Lime 2001; Garrigós Simón et al. 2004).

From the point of view of PAs managers, the Visitors' Crowding Perception indicator, which can help to measure the level of negative impact of increasing visitor load in a particular protected area, may be of interest and importance (Vaske et al. 1986; Nasa, Emphandhu 2010). The visitors' crowding perception level has hence been already estimated in many protected areas all over the world (Manning 2002; Sterl et al. 2004; Shelby, Vaske 2007; Nasa, Emphandhu 2010; Schamel 2012; Wyttenbach et al. 2012). Most of these research endeavours were done using a method developed by T. A. Heberlein and J. J. Vaske (1977) and based on a nine point Likert scale (Heberlein, Vaske 1977 after Vaske, Shelby 2008).

The aim of the article is to estimate the acceptable level of crowding in cable car destinations located in the Tatra Mountains in two different PAs across the Polish and Slovak border. The additional goal of this research is to gain information on what factors and how they affect the perception of crowding by visitors in those two areas of the cable car.

## Methods

### Study area

The Tatra Mountains are the highest mountain range in the western Carpathians. The Tatras are protected as national parks on both sides of the Polish-Slovak border. The national park located on the Polish side is called Tatrzański Park Narodowy (TPN) and covers 212 km<sup>2</sup> of the Tatras. The surface of the national park that functions in the Slovak part of the range, named Tatranský Národný Park (TANAP), is much larger (738 km<sup>2</sup>). This means that the national park on the Slovak side of the border is three times bigger than on the Polish side. Since 1992

both parks have also been protected as a UNESCO Biosphere Reserve (*Turistický Atlas Slovenska* 2005; Konopska 2006; TPN 2019; TANAP 2019).

For the purpose of this research, the authors have decided to focus on cable car destinations located in both national parks. Kasprowy Wierch (K.W.; 1987 m a.s.l.) is a peak located on the Polish-Slovak border, with a cable car built in 1936 on the Polish side. The current capacity of the cable car is 180 people per hour in the summer season and 360 people per hour in the winter season. Additionally, there are also two chairlifts that usually operate only during the ski season, although in 2022, one of the chairlifts also operated in the summer. In addition, this area is accessible using several marked hiking trails. The vicinity of Kasprowy Wierch is among the most frequently visited sites in the TPN. The statistical data shows that during the summer peak season visitor load in this area can reach as many 6000–7000 people per day (Zachwatowicz 1936; Czochoński, Szydarowski 2000; Balon, Jodłowski 2014; Taczanowska et al. 2016).

The Skalnaté Pleso area (S.P.; 1772 m a.s.l.) is located in the Slovak part of the Tatra Mountains. It is a mountain lake area located under the Lomnický Štít (2634 m a.s.l.), which is the second highest peak in the Tatra Mountains. The first cable car, which leads to Skalnaté Pleso, was built in 1938. In 1940, another cable car from Skalnaté Pleso to Lomnický Štít was constructed. Currently there are four cable cars operating there during the summer season: (1) a cable car from Tatranská Lomnica (903 m) to middle station Štart (1172 m a.s.l.) – with a capacity of 900 people per hour; (2) a cable car from Štart to Skalnaté Pleso – capacity: 2400 people per hour; (3) a cable car from Skalnaté Pleso to Lomnický Štít – capacity: 42 people per hour; and (4) a chairlift from Skalnaté Pleso to Lomnické Sedlo (2196 m a.s.l.) – capacity in the summer season: 540 people per hour; capacity in the winter season: 900 people per hour. Similar to Kasprowy Wierch, this area is also accessible using marked hiking trails. Skalnaté Pleso is also one of the most visited places in TANAP. Approximately 3000–4000 people per day visit it in the summer (Bohuš 2003; Šturcel, Švajda 2005; *Turistický Atlas Slovenska* 2005; Hibner 2015).

## Data collection process

The data analysed in the text were collected as part of two research projects: (1) Visitor monitoring in the Tatra National Park – a pilot study – Kasprowy Wierch, and (2) Characteristics of tourists' movements in the Skalnaté Pleso Area (as a part of a doctoral thesis – Hibner 2018). To gain information on visitors' crowding perception, an on-site survey (PAPI: Paper-and-Pencil Interview Technique) was conducted during the summer seasons of 2014 and 2015. A total of 3304 questionnaires were collected (K.W. – N = 2619; S.P. – N = 685). Respondents were asked to evaluate visitor load in research areas using a five-point Likert scale, where 1 stood

for 'too few visitors' and 5 was understood as 'too many visitors'. To facilitate the comparative analysis process, the answers were subsequently grouped into three main categories: 1 – 'too few visitors'; 2 – 'adequate number of visitors' and 3 – 'too many visitors'. Additional information such as: gender, age, group size and trip type were included in the questionnaire form. At the same time, a manual count of visitors was conducted in both research areas.

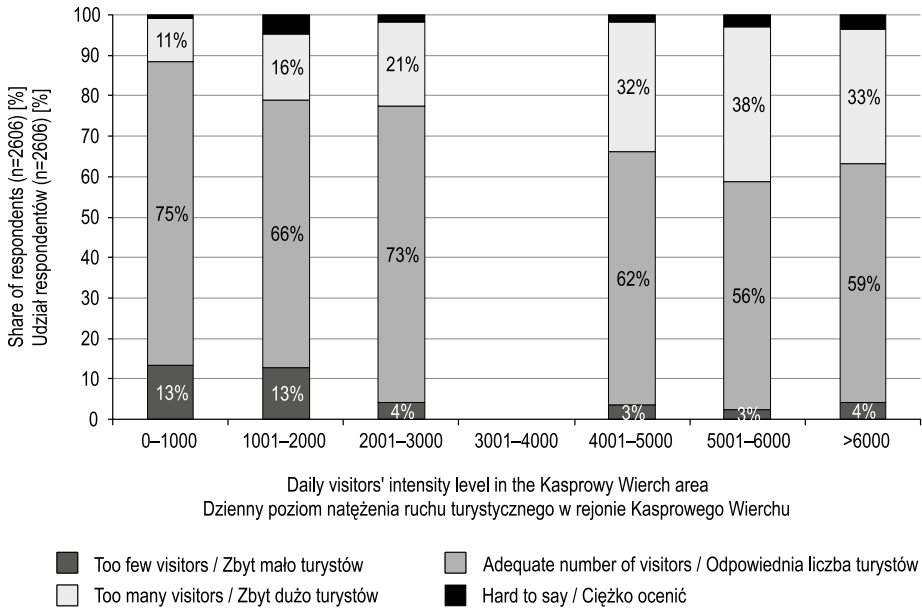
## Data analysis

To determine the acceptable level of visitor load – the social carrying capacity analysis – the correlation between visitor opinion on the level of crowding and the daily sum of manual counting was examined for both research areas. The next step of the research included looking at the relationship between visitors' opinion on the level of crowding and the type of trip. The proxy for the latter was the type of cable car ticket purchased by the respondents. In general visitors have a choice of three types of ticket for a cable car in the analysed mountain areas: a return ticket (travel up and down), a one-way ticket up (only ascent to the research area) and a one-way ticket down (only descent from the research area). The fourth distinguished trip type represents visitors who did not buy a ticket for a cable car at all but arrived nearby the upper station of the cable car on foot. The relationships between the above variables were analysed by cross-tabulation (Chi-square test). Sociodemographic variables (such as: age, gender, group size and level of educational attainment) were compared with the visitors' perception of crowding. SPSS software was used for the purpose of statistical analysis.

## Crowding in Kasprowy Wierch and Skalnaté Pleso seen from the point of view of visitors to both areas

### Perception of crowding

The results of the general questionnaire showed that the respondents in both study areas tended to declare that the number of visitors during their stay was acceptable. The tolerance to crowding ranged between 56–75% in the Kasprowy Wierch area and 65–80% in the Skalnaté Pleso area and depended on the level of flow intensity (fig. 1; fig. 2). In both sites, a decrease in the acceptance of crowding among respondents was noted when the number of visitors reached the level of 4001–5000 people per day. Hence, the share of respondents who declared that the number of visitors is too high increased to more than 30% in both study areas. The results showed that the respondents in the Skalnaté Pleso area seemed



Visitor numbers between 3001–4000 were not recorded on any day

Liczba turystów w przedziale 3001–4000 nie została odnotowana w żadnym dniu

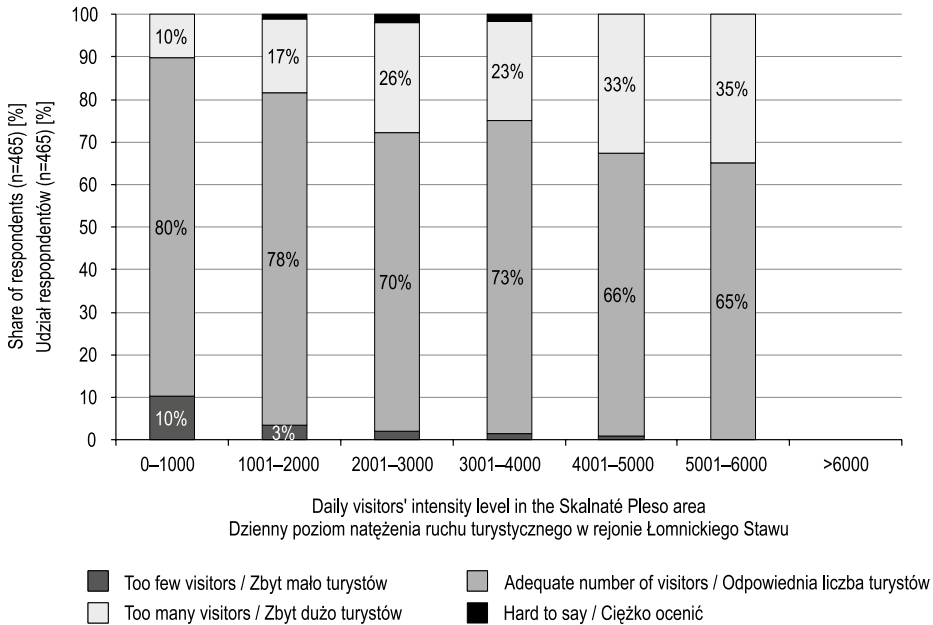
Fig. 1. Visitors' perception of crowding in the Kasprowy Wierch area in 2014

Ryc. 1. Percepcja zatłoczenia w ocenie turystów w rejonie Kasprowego Wierchu w 2014 r.

Source: own elaboration based on Taczanowska et al. 2016; Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016; Hibner 2018.

to be to some extent more sensitive when it comes to the perception of crowding of visitors. Slightly more respondents from Skalnate Pleso declared that the number of visitors is too high, when the visitors' flow increased to over 2000 people per day (26%). Furthermore, when the number of tourists reached the level of around 2000 people per day, visitors from Kasprowy Wierch (13%) declared that there is too few people in this research area (fig. 1; fig. 2).



Visitor numbers greater than 6000 were not recorded on any day

Liczba turystów w przedziale powyżej 6000 nie została odnotowana w żadnym dniu

Fig. 2. Visitors' perception of crowding at the Skalnate Pleso area in 2014 and 2015

Ryc. 2. Percepcja zatłoczenia w ocenie turystów w rejonie Łomnickiego Stawu w 2014 r. i 2015 r.

Source: own elaboration based on Taczanowska et al. 2016; Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016; Hibner 2018.

## Visitors' perception of crowding and type of trip

Taking into account the type of cable car trip, visitors' perception of crowding varied both between visitor trip types and between the two research areas. The research results showed that the level of crowding acceptance was the highest among respondents with a return ticket. However, this tendency was more clearly visible in the case of the Skalnate Pleso area. Around 80% of the respondents with a return ticket interviewed in the vicinity of Skalnate Pleso declared that the number of visitors is adequate. Another group of respondents questioned in the Kasprowy Wierch area, who accepted the existing level of crowding, were visitors who did not use a cable car at all (63%). In addition, some of the questionnaire participants in this visitor

group also declared that the number of visitors in the vicinity of Kasprowy Wierch is too small (7%) (tab. 1). On the contrary, the results from Skalnate Pleso show that the group of visitors who wanted a lower level of crowding did not use a cable car at all. Only 55% of the respondents to this group declared that the number of people present at the site was acceptable and as much as 40% of them were of opinion that

Table 1. Visitors' perception of crowding and the type of cable car trip

Tab. 1 Percepcja zatłoczenia w ocenie turystów a sposób przemieszczania się kolejką linową

Ticket type Rodzaj biletu	Kasprowy Wierch area (share of responses in %) Rejon Kasprowego Wierchu (udział odpowiedzi w %)				
	too few visitors zbyt mało turystów	adequate number of visitors odpowiednia liczba turystów	too many visitors zbyt mało turystów	hard to say ciężko ocenić	total razem
return ticket (n=1065) bilet w obie strony (n=1065)	4	65	30	1	100
ticket up (n=596) bilet w górę (n=596)	3	62	30	4	100
ticket down (n=355) bilet w dół (n=355)	2	48	46	4	100
on foot (n=601) pieszo (n=601)	7	63	28	3	100
Chi-square value: 76.653; Asymp. Sig. 2-sided: 0.000 wartość Chi2: 76,653; Istotność asymptotyczna 2-stronna: 0,000					
	Skalnate Pleso area (share of responses in %) Rejon Łomnickiego Stawu (udział odpowiedzi w %)				
	too few visitors zbyt mało turystów	adequate number of visitors odpowiednia liczba turystów	too many visitors zbyt mało turystów	hard to say ciężko ocenić	total razem
return ticket (n=332) bilet w obie strony (n=332)	4	80	15	1	100
ticket up (n=110) bilet w górę (n=110)	1	66	32	1	100
ticket down (n=51) bilet w dół (n=51)	2	69	29	0	100
on foot (n=133) pieszo (n=133)	4	55	40	2	100
Chi-square value: 63.289; Asymp. Sig. 2-sided: 0.000 wartość Chi2: 63,289; Istotność asymptotyczna 2-stronna: 0,000					

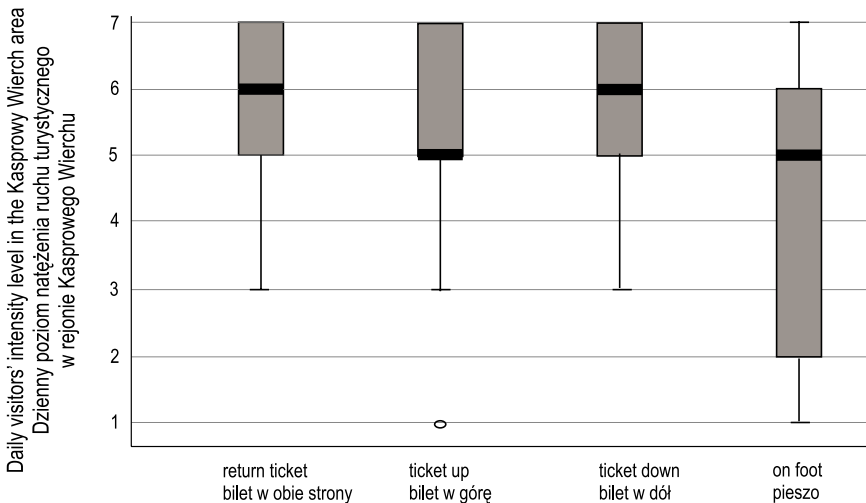
Source: own elaboration based on Taczanowska et al. 2016; Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016; Hibner 2018.



there were too many visitors in the area of Skalnaté Pleso (tab. 1). An interesting fact was also observed in the area of Kasprowy Wierch. The group of visitors who appreciated a lower level of crowding in this specific area were respondents with a one-way ticket down. Only 48% of visitors in this group accepted the current level of crowding, and 46% of them declared that there were too many other visitors. This research result is probably connected with the fact that this visitor group had to wait in the quite long queue to buy the one-way ticket in order to descend from the peak (tab. 1).

To better understand the relationship between the type of visit and the perception of crowding by visitors, the authors have also checked during which level of intensity of daily visitor flow a particular group of respondents (based on the type of cable car trip type) visited each research area (fig. 3; fig. 4). The results showed



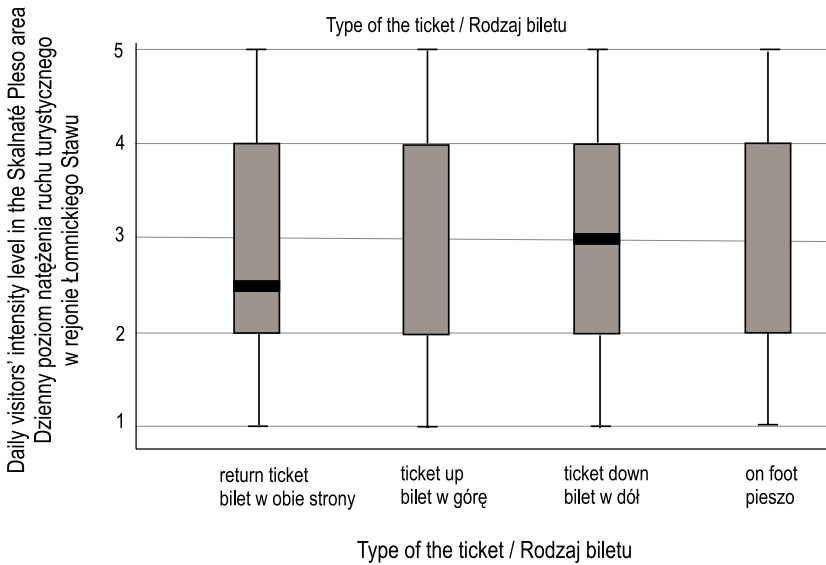
\* Level of intensity of daily visitors: 1 – 0–1000 visitors per day; 2 – 1001–2000 visitors per day; 3 – 2001–3000 visitors per day; 4 – 3001–4000 visitors per day; 5 – 4001–5000 visitors per day; 6 – 5001–6000 visitors per day; 7 – more than 6001 visitors per day.

\* Dzienny poziom natężenia ruchu turystycznego: 1 – 0–1000 turystów dziennie; 2 – 1001–2000 turystów dziennie; 3 – 2001–3000 turystów dziennie; 4 – 3001–4000 turystów dziennie; 5 – 4001–5000 turystów dziennie; 6 – 5001–6000 turystów dziennie; 7 – więcej niż 6001 turystów dziennie.

Fig. 3. Daily visitor intensity level\* and type of cable car trip in the Kasprowy Wierch area  
Ryc. 3. Dzienny poziom natężenia ruchu turystycznego\* a sposób przemieszczania się kolejką linową w rejonie Kasprowego Wierchu

Source: own elaboration based on Taczanowska et al. 2016; Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016; Hibner 2018.



\* Daily visitor intensity level: 1 – 0–1000 visitors per day; 2 – 1001–2000 visitors per day; 3 – 2001–3000 visitors per day; 4 – 3001–4000 visitors per day; 5 – more than 4001 visitors per day.

\* Dzienny poziom natężenia ruchu turystycznego: 1 – 0–1000 turystów dziennie; 2 – 1001–2000 turystów dziennie; 3 – 2001–3000 turystów dziennie; 4 – 3001–4000 turystów dziennie; 5 – więcej niż 4001 turystów dziennie.

Fig. 4. Daily visitor intensity level\* and type of cable car trip in the Skalnate Pleso area  
Ryc. 4. Dzienny poziom natężenia ruchu turystycznego\* a sposób przemieszczania się kolejką linową w rejonie Łomnickiego Stawu

Source: based on Taczanowska et al. 2016; Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016; Hibner 2018.

that the Kasprowy Wierch respondents, who used a cable car (with a return ticket or a one way ticket) had mostly visited that research area when the number of visitors was very high (over 5000 visitors per day). In turn, respondents, who did not use a cable car (arrived to the peak on foot) had visited the area of Kasprowy Wierch during different levels of daily visitors' flow intensity (fig. 3). When it comes to Skalnate Pleso area, respondents from all trip type groups had mostly visited that research area when the number of visitors ranged between 1000 to 4000 people per day (fig. 4).

### Visitors' perception of crowding and their socio-demographic characteristics

There were no significant links between crowding perception and socio-demographic variables. Especially characteristics such as gender or age of the respondents did not significantly affect the level of crowding perception. However, some trends in crowding perception were observed among visitors with different levels of educational attainment. Respondents with a university (master) degree or a college (bachelor) diploma felt more dissatisfied with the number of other visitors, especially in the Kasprowy Wierch area. For example, although 64% of respondents with a college level of education declared that the number of visitors in this area is acceptable, 29% of them thought that there are too many visitors. Similarly, a high but lower share of respondents with a university degree declared that the number of visitors to Kasprowy Wierch is adequate (60%) but more than a third of them considered the number of visitors to be excessive. When it comes to the Skalnaté Pleso area, only respondents with a university degree felt more dissatisfied with the number of people (tab. 2).

Some differences in crowding perception were also observed in terms of the group size category. In both research areas, respondents who travelled alone were less likely to declare that the number of visitors in those specific areas was adequate (K.W. – 56%, S.P. – 53%). Moreover, this group of respondents were more likely to declare that the number of visitors was excessive (around 35% in both research areas). Furthermore, in both sites, visitors who travelled in small groups (3–5 people) more often perceived the number of visitors as adequate (K.W. – 64%, S.P. – 77%). Respondents representing this group size were also less likely to think that the number of visitors was too big (K.W. – 29%, SP – 18%). It is worth mentioning that bigger visitor groups (more than 10 people) were under-represented in the survey; thus, results for this group size are not robust (tab. 2).

Tab. 2. Visitors' perception of crowding and their socio-demographic characteristics\*

Tab. 2. Percepcja zatłoczenia a profil społeczno-demograficzny turystów\*

Share of respondents (%) / Udział respondentów (%)								
Characteristics/Study area Cechy/Obszar badań	too few visitors zbyt mało turystów		adequate number of visitors odpowiednia liczba turystów		too many visitors zbyt mało turystów		hard to say ciężko ocenić	
	K.W.	S.P.	K.W.	S.P.	K.W.	S.P.	K.W.	S.P.
Gender / Płeć								
female / kobieta	4	4	61	72	33	23	2	1
male / mężczyzna	5	4	63	70	30	26	3	1
K.W. chi-square value: 4.230; Asymp. Sig. 2-sided: 0.238; S.P. chi-square value: 1.094; Asymp. Sig. 2-sided: 0.779 but poor data distribution K.W. wartość Chi2: 4,230; Istotność asymptotyczna 2-stronna: 0,238; S.P. wartość Chi2: 1,094; Istotność asymptotyczna 2-stronna: 0,779, ale słaby rozkład danych w komórkach								
Age / Wiek								
less than 18 / mniej niż 18	2	0	64	100	30	0	4	0
18–24	4	4	63	73	31	24	2	0
25–34	4	6	63	69	31	25	2	0
35–44	4	2	61	71	33	26	2	1
45–54	4	3	61	75	32	18	3	3
55–64	6	3	63	71	29	26	3	0
more than 64 / powyżej 64	2	3	62	66	32	28	4	3
K.W. chi-square value: 8.669; Asymp. Sig. 2-sided: 0.967; S.P. chi-square value: 20.761; Asymp. Sig. 2-sided: 0.292 but poor data distribution K.W. wartość Chi2: 8,669; Istotność asymptotyczna 2-stronna: 0,967; S.P. wartość Chi2: 20,761; Istotność asymptotyczna 2-stronna: 0,292, ale słaby rozkład danych w komórkach								
Education level / Poziom wykształcenia								
elementary/lower secondar podstawowe	0	0	67	85	27	15	7	0
vocational / zawodowe	6	0	67	76	25	24	1	0
collage / średnie	4	3	64	74	29	22	3	1
university / wyższe	4	5	60	69	34	25	2	1
K.W. chi-square value: 16.371; Asymp. Sig. 2-sided: 0.060; S.P. chi-square value: 6.145; Asymp. Sig. 2-sided: 0.725 but poor data distribution K.W. wartość Chi2: 16,371; Istotność asymptotyczna 2-stronna: 0,060; S.P. wartość Chi2: 6,145; Istotność asymptotyczna 2-stronna: 0,725, ale słaby rozkład danych w komórkach								

Share of respondents (%) / Udział respondentów (%)								
Characteristics/Study area Cechy/Obszar badań	too few visitors zbyt mało turystów		adequate number of visitors odpowiednia liczba turystów		too many visitors zbyt dużo turystów		hard to say ciężko ocenić	
	K.W.	S.P.	K.W.	S.P.	K.W.	S.P.	K.W.	S.P.
Group size / Wielkość grupy								
alone / sam/a	5	6	56	53	35	35	4	6
two people / dwie osoby	4	5	62	67	32	26	3	1
small group (3–5 persons) mała grupa (3–5 osób)	4	3	65	78	29	18	2	1
medium group (6–9 persons) średnia grupa (6–9 osób)	5	3	62	69	32	27	1	1
bigger group (10–20 persons) duża grupa (10–20 osób)	0	0	56	71	44	29	0	0
large group (more than 20 persons) bardzo duża grupa (powyżej 20 osób)	33	0	33	54	33	46	0	0
K.W. chi-square value: 21.022; Asymp. Sig. 2-sided: 0.136 but poor data distribution; S.P. chi-square value: 20.512; Asymp. Sig. 2-sided: 0.153 but poor data distribution K.W. wartość Chi2: 21,022; Istotność asymptotyczna 2-stronna: 0,136, ale słaby rozkład danych w komórkach; S.P. wartość Chi2: 20,512; Istotność asymptotyczna 2-stronna: 0,153, ale słaby rozkład danych w komórkach								

\* data within each variable and research area type add up to 100.00%

\* dane w ramach każdej zmiennej i typu obszaru badawczego sumują się do 100,00%.

Source: own elaboration based on Taczanowska et al. 2016, Hibner 2018.

Źródło: opracowanie własne na podstawie Taczanowska i in. 2016, Hibner 2018.

## Discussion and conclusions

The research results reveal that the acceptance of crowding decreases with the increasing number of visitors to mountain areas. This observation, previously highlighted in other studies (Manning 2002; Wyttenbach et al. 2012), is not surprising, however it is worth highlighting that visitors to Skalnaté Pleso area seemed to be more sensitive when it comes to the increasing number of visitors than tourists in the Kasprowy Wierch area, even despite the fact that daily numbers of visitors to the Skalnaté Pleso area are much lower than to the Kasprowy Wierch area. This difference may stem from the fact that the surface of the Tatras on the Polish side of the border is three times smaller than on the Slovak side. Therefore, visitors from the Polish side are more used to the high visitor load in the entire Tatra National Park in Poland, and their sensitivity to the problem may be lower.

The analysis also shows that respondents who visit the mountains entirely on foot and, therefore, did not buy a cable car ticket at all, and respondents with a higher level of educational attainment are less likely to accept the existing levels of crowding. This is probably related to the higher level of ecological awareness among these group of visitors. Similarly, respondents who travelled on their own, are also less likely to accept higher levels of crowding, which is due to the fact that this group of visitors is more likely to need more solitude. However, some of the respondents also stated that there were too few visitors in the areas under investigation. The authors suggest that this is due to the fact that these respondents could feel less comfortable and safe when a smaller number of people visit the trails, especially early in the morning.

### **Perception of overcrowding in the Tatra mountains – a longitudinal perspective**

An interesting comparative material is the study conducted by TPN in the area of Kasprowy Wierch in 2006, which means that the data was collected just before the modernisation of the cable car. However, only part of this information was subsequently published as a conference abstract (Chlipała, Hibner 2013). In the above mentioned research, respondents were also asked to evaluate the number of visitors encountered at the peak of Kasprowy Wierch. Moreover, the survey participants were also divided into four groups: visitors who ascended the peak; visitors who descended from the peak, visitors who travelled only by cable car, and visitors who did not use a cable car at all. Despite some methodological differences, some similar trends were observed over time. The perception of crowding by respondents who travelled only by cable car remained the same. The opinions of other groups of visitors were also very similar. The only group whose opinions changed significantly between 2006 and 2014 was the respondents who did not use a cable car at all. Over time, the general acceptance of crowding has increased. In 2006, only 40% of visitors who arrived at Kasprowy Wierch on foot declared that the number of tourists is adequate, and around 50% of them declared that there are too many visitors. In 2014, 63% of such visitors declared that the number of tourists is acceptable, and only 28% declared that there are too many visitors. Considering the fact that the visitor load has remained at a similar level for several years, the mentioned differences can be explained by generational change. Such a generational change in visitors' opinions over time has also been noted by J. J. Vaske and L. B. Shelby (2008). E. Streberová and L. Jusková (2015) conducted research on visitors' perception of crowding in the Mlynická Valley and Studené Valleys, which are in close proximity to our research area. However, their study utilized the visual simulation method, rendering their results incomparable to our data.

## Research results versus other comparable studies

As mentioned previously, the majority of research concerning visitors' crowding perception has relied on the method developed by T.A. Heberlein and J.J. Vaske (1977, after Vaske, Shelby 2008) employing the nine point Likert scale (Vaske, Donnelly 2002; Fang, Hsu 2006; Schelby, Vaske 2007; Vaske, Shelby 2008; Emphandhu, Nasa 2010; Nasa, Emphandhu 2010; Schamel 2012; Wyttenbach et al 2012). In such studies, respondents were queried about the maximum number of people they are able to accept during their visit and about the actual number of people they have encountered on the trail. After that, they were asked to assess the level of crowding. However, a five point Likert scale was also used in the studies on crowding, for instance, by P. Sterl et al. (2004) as well as by E. Navarro Jurado et al. (2013). In our research, we employed a five point Likert scale as part of a broader research project, aiming to avoid over-expanding an already extensive questionnaire. What definitely distinguishes this research from other publications is the correlation between visitors' crowding perception with the daily visitor load in the research areas because most of the existing research relies on respondents' declarations regarding encountered visitors (Jensen 2006; Nasa, Emphandhu 2010; Emphandhu, Nasa 2010) or on visual simulation (Schamel 2012; Wyttenbach et al. 2012).

However, considering the results, we arrived at conclusions similar to those of Vaske and Shelby (2008) who analysed around 180 research articles related to visitors' perception of crowding. The authors mentioned above pointed to the fact that the perception of crowding of visitors evolves over time and that phenomenon could be influenced by generational change. Similar observations have been made in the area of Kasprowy Wierch. Vaske and Shelby (2008) also noted that the level of visitors' crowding perception depends on the type of the area. In more crowded sites, the level of acceptance by visitors of this phenomenon is higher, while in less crowded areas the level is lower. A similar trend was observed in our research. Skalnáté Pleso is visited by a significantly smaller number of tourists, but respondents from this area seem to be more sensitive to the increasing number of visitors.

## Implications for PA managers and cable car operators

The research results presented here could be of practical use not only for PA managers but also for cable car operators. In both analysed cases, the cable cars are located in the immediate vicinity of tourist trails in attractive mountain areas. Therefore, facilities such as cable cars attract a large number of visitors. Research has shown that an increased number of visitors is accepted only to a certain level. After reaching it, a significant decrease in visitors' acceptance of crowding is observed. Therefore, the results of the analysis can serve as an argument for the PA managers in their

discussions with cable car operators. The latter may be convinced not to strive for an increase in cable car capacity for practical reasons. Overcrowding and dissatisfaction of visitors could lead to a decrease in their competitiveness in the tourist market, resulting in undesirable economic outcomes.

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