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## **LONG-TERM RESEARCH INTO WEEKEND TOURIST TRAFFIC IN ROCK-CAVE OJCOW NATIONAL PARK (POLAND) FOR THE NEEDS OF SUSTAINABLE TOURISM**

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**Abstract.** Ojców National Park is distinguished geo- and landscape diversity by Polish national's parks. It is primarily associated with Jurassic rock formations and niche-caves, which are the main attractions of the park. The research covered the main places visited by tourists – the rock formations of the Castle and the Krakow Gate, the caves Lokietka and Dark Cave, as well as restaurants in the center of the village Ojców. The main focus was on the tourist load on attractions and tourist infrastructure, identifying the main trends over the 20-year observation period and developing recommendations for choosing approaches to sustainable service for visitors to the park.

The article discusses the load and structure of weekend tourist traffic in the central part of Ojcow National Park for a long period of time (1998–2017). The results are based on direct observation at the OPN entrance gates and sites on the weekends during the summer season (July–August). It has been established that the total number of visitors in the central part of the park varies from 1.2 to 2.5 thousand people, depending on the weather, which is 1.5-2 times higher than the average daily attendance. The structure of visitors is dominated by small (family) groups (85–91%) and adults and youth (over 70%). During the 20-year observation period, certain trends in the structure and spatial distribution of tourism flows have been identified. In particular, there is an increase in the number of motoring tourists, the share of cyclists (up to 15% of the total flow of visitors) and the attractiveness of educational sites.

These long-term studies of the load of tourism flow in the OPN allowed us to assert the phenomena of overtourism in the park, in particular, in its central part over the weekends. Based on the results of recording tourists and questionnaires filled in by the tourists, recommendations for the implementation of elements of sustainable development of the recreational and tourist sphere of the park have been developed. They envisage bringing a network of parking lots to the periphery of the park, dispersal of the main tourism flows, wider introduction of the educational-ambuling model of visiting with an emphasis on ecotourism activities.

**Key words:** park; tourism flow; caves; rock formations; visitors; structure; load; sustainable development.

## **ДОВГОТЕРМІНОВІ ДОСЛІДЖЕННЯ ТУРИСТИЧНОГО РУХУ ВИХІДНОГО ДНЯ В СКЕЛЬНО-ПЕЧЕРНОМУ ОЙЦОВСЬКОМУ НАЦІОНАЛЬНОМУ ПАРКУ (ПОЛЬЩА) ДЛЯ ПОТРЕБ СТАЛОГО ТУРИЗМУ**

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**Анотація.** Ойцовський національний парк вирізняється гео- та ландшафтним різноманіттям від інших польських національних парків. Насамперед він пов'язаний з

юрськими скельними утвореннями та нішами-печерами, які є головними визначними пам'ятками парку. Дослідження охопили основні місця, які відвідували туристи – скельні утворення замку та Краківської брами, печери Локетка та Темна печера, а також ресторани в центрі села Ойців. Основна увага приділялася туристичному навантаженню на атракціони та туристичну інфраструктуру, визначенню основних тенденцій за 20-річний період спостережень та розробці рекомендацій щодо вибору підходів до сталого обслуговування відвідувачів парку.

У статті розглянуто навантаження та структуру туристичного потоку вихідного дня в центральній частині Ойцовського національного парку за тривалий період (1998–2017 рр.). Результати ґрунтуються на безпосередньому спостереженні біля вхідних воріт та майданчиків ОПН у вихідні дні в літній сезон (липень–серпень). Встановлено, що загальна кількість відвідувачів у центральній частині парку коливається від 1,2 до 2,5 тис. осіб залежно від погоди, що в 1,5–2 рази перевищує середньодобову відвідуваність. У структурі відвідувачів переважають малі (сімейні) групи (85–91%) та дорослі та молодь (понад 70%). За 20-річний період спостережень виявлено певні тенденції у структурі та просторовому розподілі туристичних потоків. Зокрема, спостерігається збільшення кількості автотуристів, частки велосипедистів (до 15% від загального потоку відвідувачів) та привабливості освітніх об'єктів.

Ці багаторічні дослідження навантаження туристичного потоку в ОПН дозволили стверджувати про високий потік туристів у парку, зокрема, в його центральній частині у вихідні дні. За результатами обліку туристів та заповнених туристами анкет розроблено рекомендації щодо впровадження елементів сталого розвитку рекреаційно-туристичної сфери парку. Вони передбачають виведення мережі автостоянок на периферію парку, розпорошення основних туристичних потоків, ширше впровадження освітньо-похідної моделі відвідування з акцентом на екотуристичні заходи.

**Ключові слова:** парк; туристичний потік; печери; скельні утворення; відвідувачі; структура; навантаження; сталий розвиток.

### Introduction

The issue of tourist use of and tourism load on national parks is relevant in the development of strategies and measures to ensure sustainable development of these protected areas. To develop visitor management projects in national parks, it is important to study the structural and temporal and spatial aspects of tourism flows. When studying tourist traffic, it is necessary to use both direct methods of monitoring tourists and indirect sources of accounting for visits to national parks (Matczak, 2002). The results of research into the space-time dynamics of tourism flows serve as an important information base for planning their regulation, ensuring the quality of service and justification of targeted measures to protect the environment during tourism loads.

In this context, long-term studies of tourist traffic in national parks are especially important, which allow identifying certain trends in the dynamics of tourism load, its spatial and temporal changes, as well as the factors that determine these changes. At the same time, direct studies of tourist traffic in the national parks during the periods of the highest influx of visitors (summer season, weekend periods) are relevant. During such periods of maximum park attendance by tourists, the issue of arranging and regulating tourist traffic from the point of view of preservation of the natural environment and ensuring comfortable stay of visitors become more relevant.

Ojców National Park (Polish: Ojcowski Park Narodowy, OPN) in the Lesser Poland

Voivodeship has been chosen as the object of many years of tourist traffic research as one of the most visited national parks in Poland. The article gives the results of a joint long-term study of the tourist traffic by park staff and scientists of Lviv National University with the involvement of trainee students for the period 1998-2017.

The aim of the research is to study the weekend tourist traffic in OPN over a 20-year period to identify structural and spatial changes, the main trends in the dynamics of tourism flows and develop measures to regulate the tourism load in the park and improve visitor management. The article considers methodical aspects of studying direct and indirect accounting of tourists, analyzes the dynamics of the total number of tourists in the park for the twenty-year period, investigates the peculiarities of space-time dynamics of tourism flows at the weekends for the central – most visited – part of the park and gives recommendations for the development of organizational and infrastructural measures for the regulation and provision of services to tourism flows in the OPN in the context of sustainable development requirements. The paper considers the main models of visitors' stay in the park over the weekend and the issue of developing a range of ecotourism programs for tourists.

**Methodical framework and information base of the research into tourist traffic in OPN.** The study of tourist traffic in OPN has a significant number of publications that reflect the space-time dynamics of tourist traffic in recent decades (Partyka, 2002, 2010, 2017, 2018a). Some publications addressed topics related to the motives of traveling to the park (Ziarkowski, 2011, 2014) and the impact of the tourism load on the park environment (Zinko *et al.*, 2006; Saba, 2008; Partyka, 2018a). OPN's positioning at the present stage in terms of indicators and nature of tourist traffic among Polish national parks has been considered in a number of studies (Kruczek, Przybyło-Kisielewska, 2019; Miazek, 2020).

As noted by A. Matczak (2002), the monitoring system for the study of tourist traffic in protected areas is based on three types of source materials: indirect sources, direct surveys of the size, structure and spatial distribution of tourists, as well as through visitor questionnaires. In addition, P. Miazek (2020) proposes another form of accounting for park visitors – automatic one using meters.

The OPN territory ensures a wide use of methods of indirect accounting for tourism flows as well as methods supplemented with direct surveys. Since 1995, tourists have been accounted for by the number of tickets sold at the main attractions, parking lots and W. Szafer Museum, supplemented by the registration of the age structure of visitors.

Direct registration of tourists in the park was arranged during the weekend (Saturday-Sunday, July or August) during the internships of students from the Department of Tourism of the Faculty of Geography of Ivan Franko National University of Lviv for twenty years (1998-2017). The registration of tourists at the entrance "gates" of the central most visited part of the park (parking lots, pedestrian and road bridges on the Prądnik River) and its main attractions (castle, caves, rocks), as well as service facilities (restaurants, souvenir stalls) was carried out for 8 hours (from 9.00 am to 05.00 pm). 20 to 25 students-registrars were simultaneously engaged in the creation of a network of tourist traffic monitoring points (Fig. 1). The following parameters were recorded at the accounting (registration) places: number of visitors; their age structure – children (up to 15 years of age), youth (up to 30 years of age), adults (up to 60 years of age), senior

citizens (pensioners of age) over 60 years of age; form of attendance – individual tourists, small groups (2-6 people), medium and large groups (> 6 people); gender distribution of visitors. The geography of visitors and the length of stay in the park were studied through the number of arriving (departing) cars and passengers and by binding cars to specific voivodships based on the registration plates. Specialized tourists – cyclists and equipped hikers – were also recorded separately at the monitoring points.



Fig. 1. Students of Ivan Franko National University of Lviv – participants in the study of tourist traffic in OPN in July 2017 (photo by Yu. Zinko)

To study tourist traffic in national parks, it is also important to analyze the space-time structure, which is manifested in the distribution of tourists by major sites, service points and tourist routes for a particular period of research (Matczak, 2002; Zinko *et al*, 2007; Turystyka w OPN, 2020). The practice of accounting for tourists in OPN involves daily registration of visitors to the main sites of organized visits and indicates their distribution by specific time cross-sections (day, month, season, year).

When studying the space-time structure of tourist traffic at the weekends in the park, 2 models of visits by tourists – walking-recreation and walking-educational type – were used. During 8 hours, the number of visits by tourists arriving in the park (leaving the park) at the below basic spatial elements was registered: entrance "gates", service transit points and target visit sites (Fig. 2). Such models allowed recording, for example, the hourly distribution of tourists in the central part of the park during the day. They served as the basis for the creation of space-time "cross-sections" of tourist traffic during the weekend in the central part of the park, and also allowed obtaining indicators of the total daily number of visits and length of stay in the park. The annual indicators of weekend traffic, obtained in July-August for the 20-year observation period, were compared to identify the main trends in the dynamics of the number of visitors to the sites of direct observation, changes in their structural characteristics. The reasons for the identified trends and changes related to natural-geographical, socio-economic and functional-

technical factors were clarified.

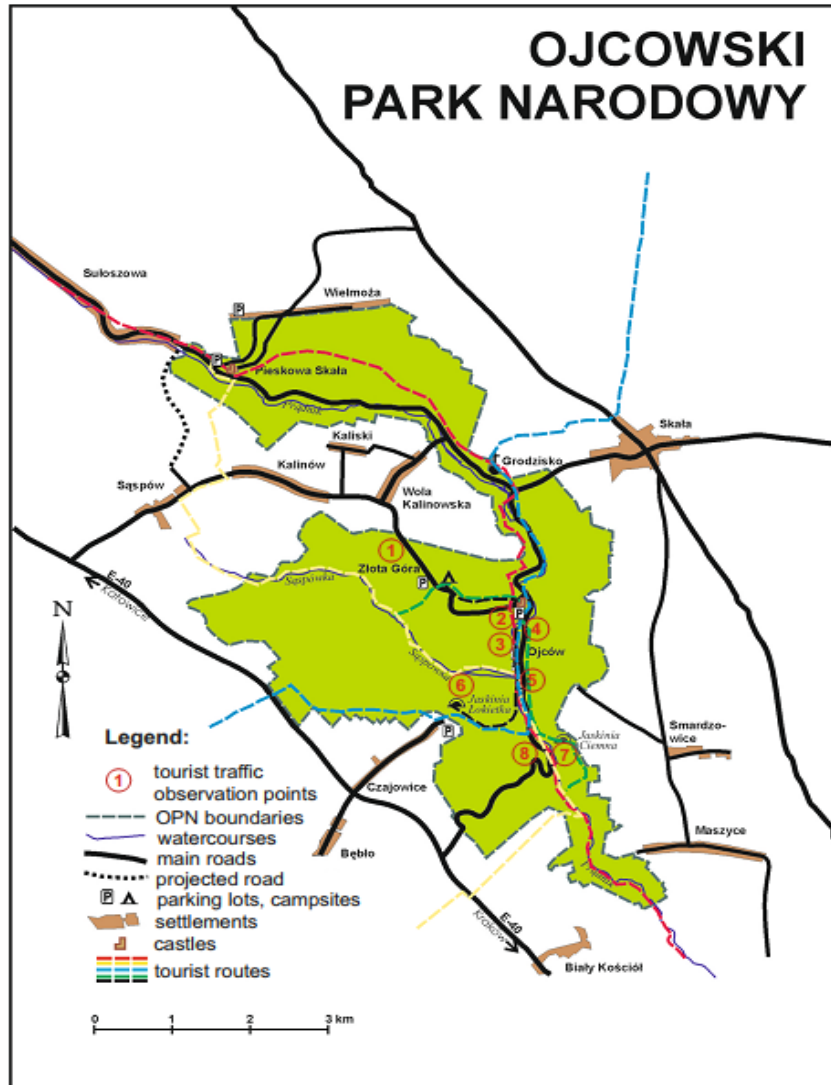


Fig. 2. OPN map with observation points

*Observation points:* 1 – parking at Złota Góra; 2 – lower parking lot; 3 – wooden bridge across the Prądnik River; 4 – asphalted bridge across the Prądnik River; 4 – eateries in the center of Ojców; 5 – Lokietek's Cave; 6 – Dark Cave; 7 – Krakow Gate rocks.

As part of long-term surveys of tourist traffic at the weekends, sociological surveys were used by questioning domestic and foreign visitors to the park. The number of respondents ranged from 30 to 45 people each year, and a total of more than 600 questionnaires were processed over a 20-year period. The questionnaires contained questions about the geography of visitors, the frequency of visits and time spent in the

park, the attractiveness of the park, sources of information about the park, wishes to be given over to the administration. These questionnaires made it possible to find out the motives of the park visitors and to inventory certain proposals for improving tourist services and reducing the negative impact of tourist traffic on the environment.

According to special studies, tourism monitoring makes it possible to regulate and limit excessive load in national parks (Spychała, Craja-Zwolińska, 2014). The issue of sustainable tourism planning for OPN is considered taking into account the experience of its implementation in a number of Polish and foreign national parks, as well as strategies for balanced development of areas (Walasa, 2019).

**Space-time analysis of OPN attendance over a 20-year period (1998-2017).** In the classification of Polish national parks according to the degree of intensity of tourist use, OPN belongs to the class of parks with a significant intensity of tourist use, along with such parks as Tatra, Kampinos, Karkonosze, Pieniny, Wolin National Parks (Liszewski, 2009). In particular, OPN ranks high among parks: 3rd place in terms of the number of tourists per 1 hectare – 199.5 people (after Pieniny and Kampinos National Parks), 5th place in terms of the number of tourists per 1 km of road – 1.1 people (Kruczek, Przybyło-Kisiełewska, 2019). This park is characterized by the phenomena of overtourism – excessive tourism load with a tourist density of 19.5 thousand people per 1 km<sup>2</sup> (Kruczek, Przybyło-Kisiełewska, 2019), which gives it 3rd place in the ranking of Polish national parks with a significant intensity of tourist traffic. According to the ranking of Polish national parks by the total number of tourists in 2017, OPN ranked 8th with 430 thousand tourists (GUS, 2017).

As already noted, the OPN has been recording visitors at major sites since 1995 on the basis of tickets sold to major natural, historical, cultural and educational attractions (Table 1). The main visited and officially registered sites include: Lokietek's Cave and Dark Cave, Pieskowa Skala Castle and Ojcow Castle, as well as the Wladyslaw Szafer Museum. According to the data from the table "OPN Tourist Attraction Attendance in 1998-2019", the most visited sites in the park are the Lokietek's Cave and Pieskowa Skala Castle and Ojcow Castle. During the study period of 1998–2017, the average annual attendance was as follows: Lokietek's Cave – 103,650, Pieskowa Skala Castle – 89,076, Ojcow Castle – 57,147, Wladyslaw Szafer Museum – 28,887, Dark Cave – 24,245. The total park attendance was significantly influenced by the planned repairs and reconstructions of certain sites during this period, which made them inaccessible to visitors (Wladyslaw Szafer Museum, Pieskowa Skala Castle, Ojcow Castle). The total number of registered tourists at the visited sites ranged from 209 thousand people in 2009 to 427 thousand people in 2016.

The factors behind significant tourist traffic to the park include the following: location near large agglomerations (Krakow and Silesia), convenient communication accessibility, proper level of infrastructure (tourist routes, accommodation facilities on the territory of the park and hotels in its immediate vicinity, eateries). The established reasons behind the tourist traffic to the park are important geographical and natural, socio-economic and functional-technical reasons (Miazek, 2020) with the geographical-natural and functional-technical factors being the top ones.

The main number of visitors (approximately 70%) come in May-June and September-October and this is because of school field trips. By type of seasonality, A. Matczak

(2002) suggests classifying this park as a sightseeing park. The number of participants in the Educational and Didactic Center during this period ranged from 7.2 thousand to 9.7 thousand people.

Table 1. OPN Tourist Attraction Attendance in 1998-2019, the number of people

Year	Lokietek's Cave	Pieskowa Skala Castle	Wladyslaw Szafer Museum	Dark Cave	Ojcow Castle
<b>1998</b>	136,120	109,607	39,667	22,924	17,243
<b>1999</b>	128,525	97,660	38,225	22,056	12,684
<b>2000</b>	107,241	81,557	37,156	21,139	19,710
<b>2001</b>	98,915	75,959	31,545	17,568	18,618
<b>2002</b>	98,613	77,433	32,514	13,976	12,512
<b>2003</b>	107,767	87,906	30,496	19,426	22,680
<b>2004</b>	106,199	83,315	29,857	20,365	20,139
<b>2005</b>	105,656	77,880	31,639	21,907	50,875
<b>2006</b>	110,129	80,986	28,959	21,765	60,016
<b>2007</b>	118,272	95,720	30,028	25,219	52,090
<b>2008</b>	104,674	101,942	303 by 28.02	24,466	70,061
<b>2009</b>	104,637	83,254	closed	27,129	74,870
<b>2010</b>	89,039	73,268	23,974	22,794	78,600
<b>2011</b>	99,175	74,483	27,847	28,179	66,876
<b>2012</b>	95,393	88,910	26,468	26,332	57,313
<b>2013</b>	92,302	80,370	26,179	25,470	58,800
<b>2014</b>	96,998	repairs	27,454	26,969	81,030
<b>2015</b>	98,904	repairs	25,882	30,232	80,505
<b>2016</b>	113,155	164,973	27,281	32,829	89,921
<b>2017</b>	118,893	141,641	26,804	31,504	91,470
<b>2018</b>	132,868	133,749	25,226	32,474	89,061
<b>2019</b>	119,802	113,529	25,811	34,150	89,257

Source: Turystyka w OPN, 2020, as amended

Studies of trends in the tourism load on the OPN territory, based on the recorded sites for more than 20 years, show its growth in recent years. This trend has become especially pronounced since 2016 due to the highest rates of visits to Pieskowa Skala Castle and Ojcow Castle as well as Lokietek's Cave (Table 1).

To get to the national park, visitors mostly use different types of vehicles. According to the number of vehicles in the main parking lot of the park based on the sale of tickets for the period 1998-2017, the average number of vehicles is 34,617. Private cars (31,820, 92%) predominate among the motor vehicles, buses and minibuses account for 2,434 vehicles (7%), and motorcycles account for 1,363 vehicles (approximately 1%) (Partyka, 2018). In terms of accessibility, the park is classified as a well-accessible suburban park (Miazek, 2020).

Studies of the motives for visiting OPN based on a survey of tourists showed that they are dominated by: landscape watching (51%), local history studies (21%) and recreation (20%) (Ziarkowski, 2011). The most attractive elements of the landscape, according to the respondents, is the terrain – picturesque rocks, valleys and cultural heritage sites (castles, churches, resort architecture). The main symbols of the park (Ziarkowski, 2011) included Pieskowa Skala Castle and Ojcow Castle, Hercules's Bludgeon and Lokietek's Cave (15%). This suggests the need to preserve park's natural and cultural landscape for future generations of tourists as a basis for travel.

**Load, structure and spatial distribution of tourist traffic in the weekend (according to long-term observations 1998–2017).** The central part of the OPN, with an area of approximately 10 ha, is the most visited area for tourists due to the successful combination of various attractions and the developed network of roads, recreation areas and facilities. It stretches from the ruins of Ojcow Castle in the north to the Krakow Gate rocks in the south. It covers elements of the former "resort" park with historic hotels "Pod Lokietkom" (now the OPN Wladyslaw Szafer Museum) and "Pod Kazimierzem" (now the OPN educational center) and the center of Ojcow tourist village with a network of accommodation and food services facilities. This tourist area of the park includes Lokietek's Cave and Dark Cave (fig. 3) popular among tourists.



Fig. 3. Tourists in the Dark Cave  
(photo from the archives of the Ojcow National Park)

The study of the structure and spatial distribution of tourist traffic during the weekend in the central part of the OPN (between the castle park and the Krakow Gate rocks) was conducted in three basic places: the entrance gates of the park, visit and maintenance facilities and the main target object of visiting and recreation (Krakow Gate). Lower parking lot, parking lot at Zlota Gora, pedestrian bridge and automobile bridge across the Prądnik River were used as the entrance gates where visitors were registered in the central part of the park. Additionally, cyclists arriving from the Krakow direction along the old Ojcow road were registered. During the weekend, the trajectory of visitors in the central part runs along pedestrian walkways and local motor roads leading to the main



attractions (caves, Ojcow Castle, Krakow Gate rocks (fig. 4), Wladyslaw Szafer Museum). At the same time, these roads pass through a service center (cafes, restaurants and souvenir kiosks) located in the central part of Ojcow settlement. This part of the park is included in the regional hiking Trail of the Eagle's Nests from Krakow to Częstochowa (red trail), the regional hiking Krakow Valley Trail (yellow trail), the Warowni Jurajskich Trail (blue trail), and the local hiking trail from Pieskowa Skala Castle to Lokietek's Cave (black trail), and also covers the local hiking and cycling trail (green), which includes a visit to the Dark Cave and the Krakow Gate rock (Partyka, 2018b). During the weekend, two models of visiting the central part of the park predominate: ambling-recreation and ambling-educational with visits to the Lokietek's Cave and Dark Cave and Ojcow Castle. It is important to emphasize that in the ambling-recreation model a significant role is played by organized places for recreation (benches in the park), restaurants. According to the results of the study, about half of the visitors use the recreation areas during the weekend, and 25–30% of the visitors use services provided by the eateries.



Fig. 4. Researchers of weekend tourist traffic near the Krakow Gate rocks  
(photo by S. Blagodyr)

The central part of the park is the most visited part during the weekend period of spring-summer or autumn-summer season. It is characterized by a well-defined channeling of tourist traffic by the existing network of roads to the sites and facilities. The organized target network of observation points allows us to track the space-time dynamics of tourists in the weekend (Fig. 2). For 20 years, during the student internships, the annual monitoring of tourists on the weekends of July-August was ensured by means of direct registration of tourists at observation points.

For the 20-year observation period (1998–2017) during 8-hour registrations, the following fluctuations in the attendance on summer weekends at the entrance gates were recorded: parking lots (lower and on Złota Góra) from 475 to 770 people, at the footpath

entrance (wooden bridge over the Prądnik River) from 750 to 999 people with a maximum of 195 visitors per hour, and at the local road crossing across the Prądnik River from 453 to 723 visitors with a maximum of 102 visitors per hour. Attendance at major attractions for the same study period should be as follows: Lokietek's Cave – from 470 to 682 visitors, Dark Cave – from 161 to 260 visitors, Ojcow Castle (area of about 1 ha) – from 433 to 770 visitors. At the main destination for hikers and cyclists – Krakow Gate (adjacent area of about 0.5 ha) – the number of tourists during the study period ranged from 550 to 1,991 visitors with a maximum of 430 visitors per hour. Such fluctuations in the number of visitors in different years at the observation points in most cases were determined by weather conditions: in cloudy and rainy and cool weather the number of visitors decreased, and in sunny and warm weather it increased. Figure 3 shows a comparative curve of the daily dynamics of visitors at the observation point "Krakow Gate" in different weather conditions in 2012 (cloudy and rainy weather) and 2013 (sunny warm weather).

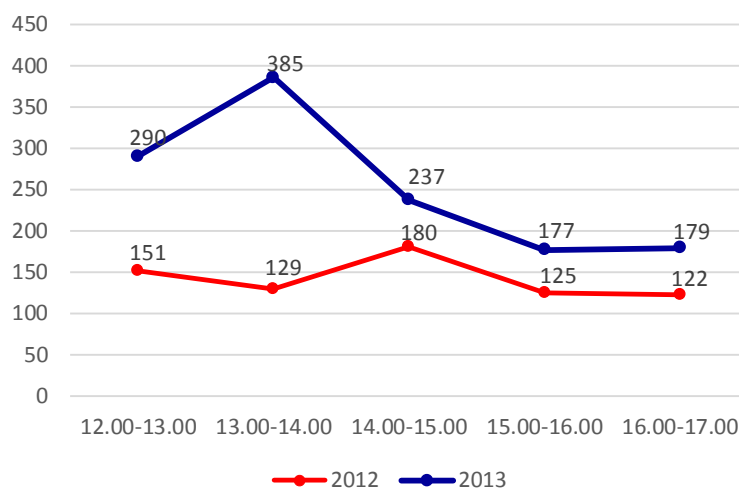


Fig. 5. Daily dynamics of visitors at the observation point "Krakow Gate" in different weather conditions in 2012 (cloudy and rainy weather) and 2013 (sunny warm weather).

In general, the total number of visitors on summer weekends at the entrance gates, taking into account the arrival of cyclists along the "old Ojcow road", ranged from 1.2 to 2.5 thousand people in the central part of the park. If we take into account the area of the central part of the park (approximately 10 ha), the load rate is 110–220 people/ha. This is the average number of visitors to the central part of Ojcow, while the number of visitors to Ojcow Castle and in the Krakow Gate area during the day is much higher and is several hundred people per 1 ha. In general, the hourly analysis of the number of visitors in different weather conditions records a 1.5–2.5-fold increase in the number of tourists under comfortable weather conditions.

Long-term studies of weekend tourist traffic made it possible to analyze in detail the structure and spatial distribution of visitors at the main observation points and trends in their change over a 20-year period.

*The structure and dynamics of visitors on weekends at observation points.* The number of vehicles in parking lots over the years of observation fluctuated within the following limits: from 153 to 174 cars (lower parking lot) and from 85 to 134 cars (Złota Góra parking lot). The two main parking lots suggest that the maximum arrival of motoring tourists is between 10.00 am and 11.00 am in the lower parking lot, and in Złota Góra parking lot this maximum shifts to midday - 01.00 pm due to the partial closure of the lower parking lot. A detailed analysis of the arrival and departure of vehicles using recorded registration numbers made it possible to establish the predominant duration of their stay in the park. It ranges from 2 to 4 hours. Recorded registration numbers served as the basis for studying the geography of motoring tourists. They testify that over the years of observations, motoring tourists from Lesser Poland Voivodeship (from 35% to 44%) and Silesian Voivodeship (20–28%) predominated, as these are the closest territories. In particular, most of the cars from Lesser Poland Voivodeship were from Krakow and Olkusz counties. There are also significant flows of tourists from Lesser Poland Voivodeship (11–16%) and Świętokrzyskie Voivodeship (6–9%).

In recent years, a study was also conducted of places of unstructured parking lots (from the area near the "Chapel on the Water") when the lower parking lot is full in the afternoon. Their number ranged from 152 to 250 cars. In general, according to the results of many years of research, it can be stated that the number of cars arriving at the weekend in the central part of the park often exceeds 500 cars (official parking lots and "unstructured parking").

Visual assessment of the age structure at the entrance gates of the park (parking lots, wooden and asphalted bridges) over the years of observation showed the following ratio of the main age groups: adults – 32–45%, youth – 35–36%, children – 13–25%, pensioners – 9–15%. It was recorded that the organizational form of visiting in the entrance area is dominated by small groups (2–6 people) – from 83% to 91% of visitors, individual tourists make up 4–7% of visitors, and large groups make from 1 to 2%.

In turn, for the main destination of the park walks – the Krakow Gate rocks - the predominance of adults (18–38%) and youth (36–51%) was recorded in the structure of visitors over the years of observations, and small groups predominated among the groups (80–91%). In the structure of visitors, a significant share is made by cyclists (10–15%), their share has grown especially in recent years of research. The maximum number of visitors here is observed at 01.00 pm – 03.00 pm. We should note that tourists go to the Krakow Gate from several directions: the main footpath, the local asphalted road, the footpath from the Lokietek's Cave and the old Ojcow local road (mostly cyclists). In the age structure of visitors to the caves (Lokietek's and Dark), there was a significant predominance of youth groups (38–41%).

In the central part of the main trail there are food service facilities (cafes, restaurants, shops) and souvenir shops. Observations of the attendance of eateries during the weekend period showed that the maximum load falls on the period from 01.00 pm to 03.00 pm. The total number of visitors to the food service facilities ranged from 265 to 450 people, which is approximately 25% of all visitors during the weekend.

Table 2 shows the monitoring data of visitors to the central part of the OPN during one of the weekends of July 2017 on the basis of 8-hour observations at 9 observation points. They reflect the spatial distribution of visitors at the main monitoring points:

entrance area (entrance gates), transit service area and visiting sites. It shows the number of visitors, their dynamics (those that entered and left the territory), age and organizational structure, as well as the geography of visitors.

As already mentioned, during the weekend, two models of visits are implemented in the central part of the OPN: ambling-recreation and ambling-educational ones. The ambling-recreation model is based on a walk from the castle park to the Krakow Gate rocks (1.5 km) and back, it includes a short break in the places equipped with benches (used by about 50% of visitors) and visits to food service facilities. The targets of this model are the Krakow Gate rocks, which are also attractive for its good view of the cliffs of Góra Koronna and Okopa (Dark Cave, vantage points at Góra Koronna, Wapiennik and Okopa). The total length of the walking trail is about 6 km. This model of visiting is most suitable for family groups of different ages and is dominating in the park.

Table 2. Tourist traffic during the weekend in the central part of OPN  
(observation date is July 15, 2017, from 9.00 am to 05.00 pm)

Place of registration	Number of people	Visitor structure	Geography of visitors, Voivodeship
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Entrance area</i>			
Main parking lot	502	children – 15 % youth – 32 % adults – 37 % senior citizens – 16 % <hr/> individual tourists – 7 % small groups – 91 % big groups – 2 %	By registration numbers: Lesser Poland Voivodeship – 35 % Silesian Voivodeship – 27 % Masovian Voivodeship – 8 % Other – 30 %
Parking lot at Złota Góra	111	children – 13 % youth – 22 % adults – 59 % senior citizens – 6 % <hr/> individual tourists – 7 % small groups – 93 %	By registration numbers: Lesser Poland Voivodeship – 35 % Silesian Voivodeship – 25 % Masovian Voivodeship – 7 % Other – 33 %
Wooden bridge across the Prądnik River	entered – 538 left – 461	children – 18 % youth – 22 % adults – 48 % senior citizens – 12 % <hr/> individual tourists – 4 % small groups – 85 % big groups – 11 %	Based on questionnaires: Lesser Poland Voivodeship – 26 % Podkarpackie Voivodeship – 13 % Masovian Voivodeship – 21 % Silesian Voivodeship – 9 % Other – 31 %

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Asphalted bridge across the Prądnik River	entered – 297 left – 340	children – 15 % youth – 30 % adults – 41 % <u>senior citizens – 14 %</u> individual tourists – 7 % small groups – 85 % big groups – 8 %	
<i>Transit zone</i>			
Service points	211 people (01.00 pm - 03.00 pm)		
<i>Visiting sites</i>			
Lokietek's Cave	606	children – 24 % youth – 36 % adults – 27 % <u>senior citizens – 13 %</u> individual tourists – 30 % small groups – 45 % big groups – 25 %	
Dark Cave	213	children – 20 % youth – 17 % adults – 33 % <u>senior citizens – 30 %</u> individual tourists – 8 % small groups – 80 % big groups – 12 %	
Ojcow Castle	513	children – 18 % youth – 30 % adults – 34 % <u>senior citizens – 18 %</u> individual tourists – 10 % small groups – 88 % big groups – 2 %	
Krakow Gate	1198	children – 16 % youth – 26 % adults – 48 % <u>senior citizens – 10 %</u> individual tourists – 17 % small groups – 77 % big groups – 6 %	

Source: own research

The second ambling-educational model of visiting envisages an excursion to one or two arranged park attractions – Ojcow Castle, Wladyslaw Szafer Museum, Lokietek's and Dark Caves. Excursions to these sites last from 20 to 40 minutes. After visiting 1–2 sites, visitors join the flows on the main hiking trails. According to the monitoring of weekend tourist traffic, about 30–40% of its participants visit the above-mentioned sites.

A survey of domestic and foreign tourists in OPN confirmed the geography of

arrivals, recorded on the basis of the identification of registration data of motoring tourists in the parking lots of the park. Most of the respondents represented Lesser Poland Voivodeship, as well as the neighboring Silesian Voivodeship (see Table 2).

The answers to the questions concerning the motives for traveling to OPN deserved special attention during the survey. The main attractions mentioned by domestic respondents are the components of natural heritage, i.e. rocks and caves and the valley of the Prądnik River. Interest in the natural landscape of this area as a basic motive for travel was confirmed in targeted questionnaires (Ziarkowski, 2011). This is also confirmed by a current analysis of visitor photos on Google Earth (2020), where images of rocky landscapes are dominant. Another important reason for visiting OPN, according to long-term surveys, is family vacation.

Answers about several (2–4 times a year) visits to the park, about several hour stay (2–4 hours) in the park over the weekend dominated among the domestic respondents. Family traditions and school trips are mostly mentioned as sources of information about the park. Among foreign tourists, the sources of information included websites and advice by their Polish acquaintances.

However, according to the respondents, the problems associated with staying in OPN include: certain phenomena of overtourism – lack of spaces at the lower parking lot, a significant number of tourists at the sites visited; unsuitability of the park for certain categories of visitors: small children, pensioners.

Regarding the feedback of the surveyed visitors to the park administration, they mentioned the need to expand the range of leisure facilities, which indicates the stereotypical perception of OPN as a city or theme park, the need to improve the condition and infrastructure of footpaths, reconstruct major attractions, including the ruins of Ojcow Castle.

*The main trends of weekend tourist traffic over a long period of observations.* A long-term study of tourist traffic during the weekend during the summer season confirms the highest rates of daily visits to the park. The total number of registered tourists in the central part of the park in this period ranges from 1.2 to 2.5 thousand visitors, depending on weather conditions. This figure exceeds the attendance of the park on weekdays by 2–2.5 times. The minimum indicators in the weekend are observed in cloudy and rainy weather. The most visited facility on weekends in OPN is the Krakow Gate, where the maximum daily total number of tourists for an 8-hour observation period reaches 1.5–1.9 thousand people on an area of approximately 0.5 ha. This facility functions as a place of short-term rest and a good vantage point to enjoy the rocky landscapes in the valley of the Prądnik River. We also recorded a significant number of visitors on the territory of the ruins of Ojcow Castle. As for other sites visited during the weekend, in recent years there has been a tendency to slightly decrease in the number of visitors to the Lokietek's and Dark Caves (by 10–14%) while the number of visitors to the ruins of Ojcow Castle is increasing.

Direct monitoring of the tourism load, its structure and territorial distribution for the most visited central part of the park for the 20-year period (1998–2017) showed a general tendency to increase in the number of visitors by 10–15% in different weather conditions. In the age structure of visitors there is a "youthification" due to an increase in the number of youth visitors and a decrease in the number of people in the category of "adults" and

people of retirement age. Visitors' geography is changing: according to the car registration numbers, the share of visitors' arrivals from the settlements of Lesser Poland and Silesian Voivodeships decreased and the share of tourists' arrivals from more remote Voivodeships (Masovian, Świętokrzyskie) increased. In terms of organization, the predominance of small groups (2-6 people) remains constant on weekends, accounting for 85 to 91% of visitors in different years. In most cases, they are represented by one or two families. Over the twenty-year period, the tendency to increase in the number of cyclists in the structure of visitors has become quite clear: while in the early 2000s it was 5-7%, in recent years it has risen to 10-15%.

It has been established that in the most visited part of the park two options of models of weekend time are dominating: ambling-recreation and ambling-educational lasting from 2 to 4 hours. The maximum number of visitors at the park attractions is observed between 01.00 pm and 03.00 pm. Significant tourism load in the weekend causes significant pressure on the natural and cultural environment of the park.

*Using the results of tourist traffic study to address issues of sustainable tourism in the park.* As already noted, the close location of the OPN to the two agglomerations - Krakow and Silesian Voivodeship - made it a popular place to visit, including on weekends. Significant car traffic to the central part of OPN with excessive concentration of cars in the park parking lots and side roads has been observed for many years. Proposals to address the problem of excessive traffic include the construction of new parking lots on the outskirts of the park, as well as traffic restrictions on the district (local) road from Złota Góra to Grodzisk and the Voivodeship road that runs through the Prądnik valley from Grodzisk to Pieskowa Skala (Partyka, 2018). Another possible solution to this problem could be public communication from Krakow to Ojców, especially on weekends and holidays. OPN's agenda includes the issue of a dramatic change in visiting the park due to the decrease in car traffic as a factor that negatively affects the performance of the park's main environmental function. In this context, a significant role should be played by the cooperation between the park and the administrative and economic structures of the surrounding areas on the basis of the model of Balanced Territorial Development (Walasa, 2019).

Significant tourism load in the weekend at the entrance gates, sites and the target of the dominant walks - the Krakow Gate rocks - leads to exceeding the load capacity per unit area and path length by 2-3 times compared to the average values on weekdays days for the warm season. This has a negative impact on the environment. In particular, ambling-recreation and ambling-educational activities are associated with the trampling of soil and vegetation on unpaved sections of roads and places of short-term recreation. From time to time, cyclists on mountain bikes are involved in the degradation of the natural environment, testing the slope trails for cycling (Zinko et al., 2007). The measures recommended for the implementation of elements of sustainable tourism for OPN are as follows:

a) More actively implement the ecotourism ambling-educational model of using the park during the weekend instead of the dominant ambling-recreation through the construction of new and reconstruction of the old information and eco-educational and thematic infrastructure, as well as the introduction of various forms of ecotourism (observation of natural objects, geological and botanical tourism). Respondents also note

the need to develop ecotourism during the survey;

b) Dispersal of tourism flows from the central part of the park to its peripheral zones through the creation and arrangement of new attractions in the valley of the Prądnik River. A good example of the successful operation of the new attraction can be the reconstructed mill Boroniówka;

c) Development and implementation of projects for the reconstruction and renaturalization of the most visited sites, including significantly degraded ones – the area around the Krakow Gate and the busiest roads to Okopa and to the Lokietek's Cave.

Sustainable tourism in protected areas also involves the implementation of measures that ensure a certain satisfaction of the tourist during recreational activities. The study of the structure and spatial distribution of tourist traffic over many years in general and in the weekend in particular allowed us to shed more light on the problem of the main types of visitors to the park and to characterize its long-term profile. In addition to the main target group of this park - schoolchildren and students - family tourism in OPN also deserves attention. In fact, during the weekend periods, small family groups make up the largest part (85–91%) of the total flow of visitors. Typical models of pastime (ambling-recreation and ambling-educational) should be supplemented by certain eco-educational and entertaining elements related to natural and anthropogenic history (natural didactic expeditions and quests, thematic activities related to the ancient history of the territory). Particular attention should be paid to children for whom there are not enough facilities in the park to spend time. Respondents pointed out the lack of entertainment and educational facilities for children during the surveys. At the same time, the study has shown a tendency to increase the number of cyclists from 5-7% in the early 2000s, to 10-15% in recent years, indicating the need to arrange a specialized infrastructure for cyclists, which is successfully used on cycling routes such as Green-Velo – bicycle parking lots with information and eco-educational support, bicycle rental points.

### **Conclusion**

1. Many years of research on tourist traffic in OPN, in particular during the summer weekend, made it possible to identify certain trends, structure and spatial distribution. The distribution of tourists has been established by the main recorded objects of visits, as well as the daily dynamics of tourists in the weekend. There have been negative trends related to the impact of excessive traffic to visit the park and excessive traffic on weekends during the summer. The results of the research into tourism and assessment of its impact on the environment allowed us to develop recommendations for the implementation of elements of sustainable tourism in the OPN.

In particular, traffic congestion, which creates problems for environmental protection, especially on weekends, necessitates the development of a parking system in the peripheral zone of the park, restrictions on tourist traffic through the park and wider use of public transport.

To reduce the tourism load, it is important to introduce ecotourism elements when visiting the park over the weekend by building and reconstructing information, eco-educational and thematic infrastructure and using various forms of ecotourism (environmental monitoring, botanical and geological tours). During the survey of tourists, proposals of this type were quite common.

Further research into the issue of tourism should focus on the development of



proposals for visiting OPN with a strong ecotourism component. New ecotourism products and services should be developed for various target groups, including family groups. The experience of developing this type of ecotourism products for protected areas has been tested on the example of the Babia Góra National Park. In practical terms, it is important for the park administration to continue work on keeping the rocky outcrops open (Baran, Klasa, Sołtys-Lelek, 2018), because according to the survey data, rock landscapes are one of the main motives for visiting OPN.

To create a space-time model of visiting the park, including during weekend periods, it is important to introduce automatic traffic recorders at the main points of visit. Such experience of introduction of the point of automatic registration of visitors in OPN is already available – it is established at one of entrance gates (the automobile bridge). When placing automatic monitoring points, it is necessary to take into account the long-term experience of accounting for tourists during the summer weekend periods presented by the authors.

#### BIBLIOGRAFIA

- Baran, J., Klasa, A., Sołtys-Lelek, A. (2018). Raport z prac przeprowadzonych w zbiorowiskach kserotermicznych Ojcowskiego Parku Narodowego w 2018 roku. W: Prądnik. Prace Muz. Szafera, 28, 75–90.
- Boroniówka. Stara osada młynarska (2020). Zabytkowy młyn i tartak wodny. Available from <http://boroniowka.pl/pl>
- Google Earth, 2020. Available from <https://www.google.com.ua/intl/uk/earth/>
- GUS, 2017. Available from <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/maly-rocznik-statystyczny-polski-2017,1,18.html>
- Kruczek, Z., Przybyło-Kisielewska, K. (2019). *Ruch turystyczny w parkach narodowych i konsekwencje nadmiernej frekwencji odwiedzających*. W: Parki narodowe i otoczenie społeczno-gospodarcze. Skazani na dialog. Publisher: Wyższa Szkoła Turystyki i Ekologii, 160–171.
- Liszewski, S. (2009). *Przestrzeń turystyczna parków narodowych w Polsce*, W: Gospodarka i przestrzeń, red. B. Domański, W. Kurek. Wyd. Instytut Geografii i Gospodarki Przestrzennej UJ, Kraków, 187–201.
- Maczak, A. (2002). *Metodyka badań ruchu turystycznego na obszarach chronionych*. W: J. Partyka (red.): *Użytkowanie turystyczne parków narodowych. Ruch turystyczny – zagospodarowanie – konflikty – zagrożenia*, Instytut Ochrony Przyrody PAN, Ojcowski Park Narodowy, Ojców, 17–23.
- Miazek, P. (2020). *Przyczyny zróżnicowania ruchu turystycznego w polskich parkach narodowych*. Tourism / Turyzm, Vol. 30, Iss. 1, Article 16.
- Partyka, J. (2002). *Turystyka w polskich parkach narodowych*. W: J. Partyka (red.), *Użytkowanie turystyczne parków narodowych. Ruch turystyczny – zagospodarowanie – konflikty – zagrożenia*, Ojców, 143–154.
- Partyka J. (2008). *Turystyka w parkach narodowych – zło konieczne czy sprzymierzeniec?* W: *Turystyka zrównoważona i ekoturystyka*, A. Gotowt-Jeziorska, J. Śledzińska (red.), Wyd. PTTK, Warszawa. 39–46.
- Partyka J. (2010). *Udostępnianie turystyczne parków narodowych w Polsce a krajobraz*. Prace Komisji Krajobrazu Kulturowego, no 14, ss. 252–263.
- Partyka J. (2017). *Model udostępniania Ojcowskiego Parku Narodowego*. Roczniki

- Bieszczadzkie, 25, 143–150.
- Partyka, J. (2018a). *Turystyka w Ojcowskim Parku Narodowym: problemy, granice udostępniania, dylematy*. W: Prądnik. Prace Muz. Szafera, 28, 231–244.
- Partyka, J. (2018b). *Ojcowski Park Narodowy*. Przewodnik. Wydawnictwo Muza, Kraków, 192.
- Sala, J. (2008). *Turystyka a ochrona przyrody w Ojcowskim Parku Narodowym*, W: Zrównoważony rozwój turystyki, red. S. Wodejko. Wyd. AGH. Warszawa, 303–314.
- Spychała, A., Craja-Zwolińska, S. (2014). *Monitoring ruchu turystycznego w parkach narodowych*. Barometr Regionalny. Wyższa Szkoła Zarządzania i Administracji w Zamościu, 12, 4, 171–177.
- Turystyka w OPN*, 2020. Ojcowski Park Narodowy. Available from <http://www.ojcowskiparknarodowy.pl/main/turystyka.html>
- Walasa, B. (red.) (2019). *Model optymalizacji funkcjonowania parków narodowych w Polsce w otoczeniu społeczno-gospodarczym*. Sucha Beskidzka, Wyższa Szkoła Turystyki i Ekologii, 263.
- Ziarkowski, D. (2011). *Atrakcyjność krajobrazu Doliny Prądnika w ocenie zwiedzających*. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie, 857, 63–76.
- Ziarkowski, D. (2014). *Zamki na Wyżynie Krakowsko-Częstochowskiej. Problemy konserwacji i udostępniania dla turystyki*. W: Monografie o tematyce turystycznej, nr 21, Wydawnictwo Proksenia, Kraków.
- Zinko, J., Błagodyr, S., Sirenko, I., Partyka, J., Głanowski, J. (2007). *Ocena oddziaływania ruchu turystycznego na środowisko Ojcowskiego Parku Narodowego (w świetle badań prowadzonych przez studentów geografii Uniwersytetu Lwowskiego im. Iwana Franki)*. W: Prądnik. Prace Muz. Szafera, Ojcowski Park Narodowy, Ojców, 17, 241–248.

