FOREST VISITORS DATA BEFORE AND DURING COVID-19 LOCKDOWN CRISIS: FOREST RECREATIONAL SERVICES IN THE FACE OF COVID-19 PANDEMIC STRESS

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Abstract
COVID-19 has overtaken human freedom of movement and association. Moreover, the infection has claimed numerous lives of more than a million people by the middle of 2021. Given the numerous forest ecosystems services and benefits to humans and biodiversity, urban forests and parks provide a significant part by offering urban dwellers recreational and leisure space, mental health relief, and meditation. Consequently, this data aims to give a clear state of forest visits to a forest near Brno City before and during the COVID-19 pandemic. Medical experts, leaders, and policymakers could use this data to make better decisions regarding lockdown rules, recreational services during the lockdown, and epidemiological situations. Moreover, this data will help other researchers on health and welfare issues concerning forest and urban nature visits and other recreation services. Using TRAFx Infrared Trail Counter, we counted visitors in the Training Forest Enterprise Masaryk Forest Křtiny in the outskirts of Brno City in the Czech Republic. Data (https://doi.org/10.17605/OSF.IO/8NAKW) has been prepared and presented herein for further use.

Key words: Brno city, Mental health, recreational and leisure space, urban forest services

Introduction

By 2020, the COVID-19 pandemic had claimed over 1 million dead and over 30 million infections worldwide. This situation was also compounded by long periods of lockdowns and government restrictions, which worsened many people's mental health, including school children (Galea et al. 2020, Soga et al. 2020, Bamwesigye 2021a. Geng et al. 2021). These occurrences have left many people worldwide with mental health and psychological welfare issues. The constant lockdowns that are practically necessary have also compounded the already bad situation and increased mental health rates (Sainz-Santamaria and Martinez-Cruz 2021, Lieberoth et al. 2021, Yamada et al. 2021].

Amidst this situation, the recreational forest services are sought to have played a vital role in minimizing stress if used or accessed by the people in need. Forests, urban parks, and green spaces provide leisure services necessary for visiting individuals and families (Bamwesigye et al. 2020. Wells 2000, Doli et al. 2021, Venter et al. 2021). In Oslo, for example, nature and recreation services were said to have increased by 291% of the usual outside activities before the COVID-19 (Venter et al. 2021, Wacker and Holick 2-013, Bamwesigye et al. 2021, Slater et al. 2020)

Understanding the benefits of forest ecosystems and recreational services on individual welfare is more necessary than ever (Bamwesigye et al. 2020, Doli et al. 2021, Bamwesigye et al. 2021, Derks et al. 2021) presented increasing numbers of forest visitors ranging from children to families in the studied period between January and June 2020. Their study analyzed the trends in forest park visitors in selected countries. Their results reveal interesting trends whereby there were increases in infections, whereas the number of visitors had reduced and the number of infections increased (Geng et al. 2021).

This study data provides policymakers and decision-makers a basis for future planning in epidemiological situations. More so, a ground for forest management with information for improving forest services and planning for epidemiological situations given the services and benefits of the forest and urban nature. Therefore, this data aims to provide scientific material (Data) before and during the COVID-19 pandemic for further studies. Medical experts, leaders, and policymakers in the Czech Republic and the globe could use this data to make better decisions regarding lockdown rules, recreational services during the lockdown and in epidemiological situations. Moreover, this data will help other researchers study the relationships between infections, forest and urban nature visits, and other recreation services.

Material and methods

Location of study and its characteristics

The study was conducted in the Training Forest Enterprise Masaryk Forest Křtiny (TFE) and organizational part of Mendel University in Brno and a special-purpose facility of its Faculty of Forestry and Wood Technology. Forestland property has an area of 10,265 ha. The forest forms a continuous complex immediately linking with the northern limits of the Moravian metropolis of Brno City and reaching as far as the town of Blansko[18]. The forest is situated at altitudes ranging from 210 to 575 m above sea level.

TFE enjoys an entirely exceptional position in the fulfillment of the aesthetic and educational functions of the forest. There are whole forest stands with the natural species composition left without intervention in the past. The natural beauties of local forests are intentionally maintained and improved. Forest glades established in the complex of continuous forests are kept with care. Exotic tree species have been planted around the meadows to make their surroundings more colorful and attractive. Forest springs are sought and looked after, and new fountains.

The tradition of Training Forest Enterprise Masaryk Forest in Křtiny in the development of aesthetic and educational functions of the forest is a long one. The natural beauties of the region are deliberately complemented and emphasized. Forest glades are intentionally established in the unbroken area of the forest stands, around which exotic tree species are planted to enhance the aesthetic impression. Existing forest springs are carefully looked after, and new fountains are built. Memorials and memorial tablets are being placed at selected places.

Data collection

The main goal of monitoring forest visitors, and traffic is to provide basic information about the number of visitors and data on the temporal variability of traffic and distribution of visitors within the target area. The monitoring of forest visits in recent times over protected areas and urban nature facilitates planning administration activities and sustainable management while considering the social and cultural needs of the people.

We installed the counter in July 2014 and collected hourly data until June 2018. We put the counter again in March 2021 during the COVID-19 lockdown, given the importance of monitoring forest visits. The trail visitor monitoring used automatic reader Pyro Box Compact from Eco-counter. This device counts all forest road users on the trail without distinguishing among them. Counting is based on the temperature difference between a human body and its surroundings (TRAFx Infrared Trail Counter). The readers can distinguish the direction of the movement and are installed in the narrowest places of the trails to prevent counting two persons walking side by side as one. The data are stored in one-hour intervals.

About TRAFx Infrared Trail Counter installed, It counts people on trails, paths, and sidewalks. It has an advanced microelectronic design and high-quality infrared scope. The counter has a very long battery life of up to 10 years, and its significant advantage is its large storage capacity. This counter is built for outside conditions, i.e., -40C to +55C. Unlike other trail counters, it does not require a receiving unit or reflector to operate[19]. This results in a very compact, unobtrusive design that reduces the risk of vandalism. It also works well in winter conditions. Herein, primary data in excel file for download and reuse (https://osf.io/8nakw/) (Bamwesigye 2021b).

Results and Discussion

We present data collected over the years using an installed counter in the form of a metal box (July 2014–May 2018) and the form of a wooden nest (2021) on the forest road "Červená" (Red Trail) in the Training Forest Enterprise Masaryk Forest Křtiny near Brno City. The data collected is from July 2014 to 11 June 2018, when the counter was removed. Given the COVID-19 situation, we put the counter back to the same spot from 1 March 2021 during Lockdown (Figures 1). Our results showed a spike during March, April, and May compared to June and July in 2021. The strict and heavy COVID-19 lockdown had run from November 2020 to the end of May 2021. Compared to other years, the results showed a frequency spike during March, April, and May again for 2015, 2016, 2017, 2018, and 2021 (Figures 1).

The COVID-19 lockdown had run from November 2020 to the end of May 2021. Compared to the same period of other years, the data of March, April, and May 2021 shows a higher trend, apart from a few days in April and May, on which values of 1088 and 1312 forest visitors, respectively were recorded on given days. During the lockdown, we observed significant values of 624, 595, and 873 on given days in March and 553,640, 427, 559 in April and towards the end of May.

During the warm period of the summer, the collected data show a declining trend of numbers of visitors in the forest, in each category. Due to the periods of good weather during the summer, our data illustrate more visits in the forest, but on a more stable level than very high spikes of the visiting

frequency in the spring period. In addition, it is very interesting that there were more forest visitors in the summers of 2016 and 2017 than in 2021 (Figures 1).

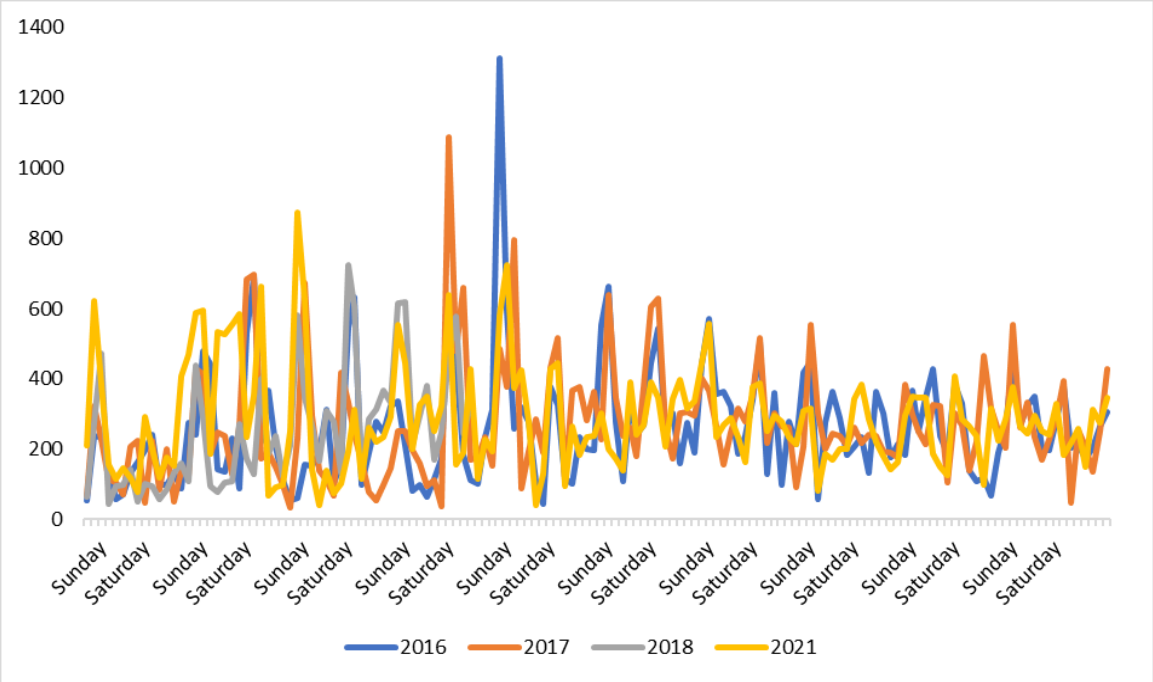

Fig. 1: Forest visitors on the weekends from 2016 to 2018, and 2021 in March to July. (X-axis is months March to July in selected years, Y-axis is the number of forest visitors at of Training Forest Enterprise Masaryk Forest Křtiny).

The studied months and years showed that 2021 had more total forest visitors at 40,616 people, 2017 at 38,502, 2015 at 37,820, 2016 at 37,491, and 2018 at 12,696 people. However, 2018 cannot be substantively counted regarding the total since June and July data are missing. The lower number of forest visitors in 2016 could be associated with other factors, such as socioeconomic characteristics and or climate. These factors could be studied in-depth to get to the gist of the discussion.
We conclude that ceteris paribus, the studied data showed a notable trend in the COVID-19 lockdown period with special attention in March, April, and May 2021. Even though previous years also recorded high visitors in the forest, the COVID-19 period showed exceptional results (Figure 1). Moreover, the year with COVID-19 presented the highest observed visitors, with more than 800 visitors than the second highest year. This trend is also reflected in the summary statistics of the selected data from March to July through the subsequent years. The mean and median scores showed high scores for 2021, 286, and 250 people, respectively. Understanding the ranges in this data can further be observed in the quartile ranges, which illustrated an almost equal distribution.

Conclusion

The COVID-19 pandemic has completely changed many people's ways of life regarding freedom of movement and work. Various studies have illustrated the immense stress associated with the pandemic, regardless of age or geographical region, due to lockdown and change in routine. Our investigation on visitors' movement at Training Forest Enterprise Masaryk Forest Křtiny allowed us to observe that more people enjoyed the forest recreation services in March, April, and May 2021 than in previous years, with minor variations on some days. We recommend follow-up research to use visitor recorders to thoroughly investigate the trend of forest visitors and big data on opinions on the role of forest ecosystem services, especially in the urban and suburban areas. Moreover, this data could help decide on future research and policy decisions regarding epidemiological situations.
Based on data analysis in previous stages of the work, the following conclusions can be formulated:
It was found that the peak visits are at the turn of April and May (after winter)-regardless of external factors. In other words, the city forest is always needed for relaxation, and its proximity to the city makes it an attractive place, especially for short-term rest. Regardless of the COVID-19 pandemic, the peak of visits to the city forest falls in the following years at the turn of April and May (after winter) and remains within similar quantitative limits. In other words, the city forest is now always needed for the

recreation of city people-people want to be among the greenery regardless of the pan-demic. The above basic statements allow us to formulate some general conclusions:
Urban society always needs contact with nature in the first spring days after winter. At the turn of April and May, the forest has the highest share of users. Hence, the organization of tourism and mass events is advisable in the spring. It is the best time to organize outdoor events: excursions, walks, picnics, festivals, etc. Thus, it is valuable information for the managers of the area and organizers of tourism and collective events.

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Souhrn

COVID-19 předběhl svobodu pohybu a sdružování lidí. Kromě toho si infekce do poloviny roku 2021 vyžádala mnoho obětí na životech, a to více než milion lidí. Vzhledem k četným službám lesních ekosystémů a přínosům pro člověka a biologickou rozmanitost mají městské lesy a parky významnou úlohu, protože nabízejí obyvatelům měst prostor pro rekreaci a trávení volného času, úlevu pro duševní zdraví a meditaci. Následně si tato data kladou za cíl podat přehledný stav návštěvnosti lesa

v blízkosti města Brna před pandemií COVID-19 a v jejím průběhu. Zdravotničtí odborníci, vedoucí pracovníci a politici by mohli tato data využít k lepšímu rozhodování o pravidlech výluky, rekreačních službách během výluky a epidemiologických situacích. Kromě toho tato data pomohou dalším výzkumníkům v otázkách zdraví a sociální péče týkajících se návštěv lesů a městské přírody a dalších rekreačních služeb. Pomocí infračerveného počítadla tras TRAFx jsme počítali návštěvníky ve Výcvikovém lesním podniku Masarykův les Křtiny na okraji města Brna v České republice.

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