

# Monitoring of illegal human activities in the Tatra National Park, Poland

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## Introduction

The Tatra National Park is located in the southern part of Poland and comprises the entire part of Polish Tatra Mountains with the area of about 211 km<sup>2</sup>. Most of the park area is encompassed by the Natura 2000 Network, both as Special Area of Conservation and Special Protection Area. TNP was created in 1954 under nature protection act that imposed strict regulations of tourism inside the park. Any kind of human activities is limited to specially designed areas, such as hiking and skiing trails or climbing areas. The park authorities are obliged to monitor natural resources and their threats. Therefore any type of activities outside designates areas are strictly forbidden and can be penalized by park rangers. However trespassing is quite common and observed in areas important in terms of nature protection. This is why monitoring of illegal human activities seems to be very important issue. Those activities vary from hiking, climbing to skiing, exploring caves and gathering plants. In the Tatra National Park camera traps are used to examine these issues and estimate the scale and type of human trespassing phenomena as well as its influence on wildlife. This method is worldwide used for wildlife (Roveroa et al., 2013; Wearn, Glover-Kapfer, 2017) as well as visitor monitoring (Hossain, et al. 2016; Miller et al., 2017).

## Methods

Monitoring by means of camera traps has been conducted in the Tatra National Park since winter 2006/2007 (Zwijacz-Kozica et al., 2015). They were used to determine the scale of trespassing, for monitoring wildlife and also estimating the number of tourists on trails. Different aims caused that each year the location and number of installed camera traps throughout the Tatra National Park vary and depend on the current needs. As a consequence there is no common methodology regarding the set up of the devices. Generally camera traps are programmed to record videos rather than take pictures, which enables to record any fast moving objects. They are installed in places as follows: forest roads, former walking paths (which are officially closed), paths and places forbidden for human activities but frequently visited by wildlife where conflict between animal and human might occur. Some of the monitored trails have recently been blocked by trees fallen by the wind. Thanks to this it is possible to check if those disturbances reduce the effects of anthropopressure in officially closed areas. Not only location but also time of installing and length of camera trap's operation time is different. Because of that it is difficult to compare data from the same location to data from different locations. As a result data from summer months of three locations with the longest history of observation and similar operation time of devices were selected to present the most approximate results. Information gained by means of these devices is helpful to determine the scale of that phenomena and study if the presence of humans affects animals. This also enabled to present the period of time between human and animal appearance as well as the time during the day when human and wildlife appear.

Around the world many computer software and websites were created to summarize and manage data from camera traps (Iwan et al., 2016). In Tatra National Park data from camera traps (films and photos) are processed manually and stored in Oracle database created by means of Esri ArcGis Programme.

## Results

Three locations were chosen to present the scale and differences regarding illegal human activities during the summer months.

In the first location, in 2014 the amount of human appearances was 54. Two years later in 2016 it was almost 50% less. However in 2017 the number was higher, up to 41.

In the second location in 2013 the amount of human appearances was 90. Due to the trail being blocked by fallen trees in December 2013 in 2014 only 40 people were noticed and 25 in 2015. However because of creating new paths the number of people in 2016 and 2017 increased to 37 and 76 people, respectively.

In the third location the monitoring has been conducted since 2013 to 2014 and in 2017. For the whole period the amount of people was about 100. The highest number 163 was in 2014.

In each location large predators important in terms of nature protection, such as brown bear, wolf and lynx occurred. What is more data gained from them shows that only few animals occurred up to a couple hours after or before human presences, most often this period is 10-12 hours. Animals were recorded mostly early in the morning and at night whereas people appeared mostly during daytime.

## Conclusions

To the present day in the Tatra National Park there is a database from camera traps observation with about 7500 records. This data is hard to process, analyze and compare due to lack of common methods of installing devices. Comparing it and concluding about the scale of illegal human activities is possible on condition that data is collected regularly from the same locations. Even though three presented locations show that camera traps are helpful to assess the number and locations of people's presence and compare them to type of animals which occurred in the same area. Thanks to this it is possible to provide more park rangers in specific and most needed areas. It was also showed that disturbances like trails blocked by the fallen trees could reduce the trespassing. In order to provide proper monitoring for the future the following issues should be taken into consideration:

1. Two devices in one location (in case one goes down)
2. Errors when object is too fast and only activates camera without recording itself
3. Constant activation of camera traps during the strong wind which causes filling the SD card and exhausting batteries – the issue demands more frequent controls
4. If locations are important in terms of nature protection monitoring has to be consequent and regular over the years.

## References

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