Visitor monitoring in practices. Few examples from the Tatra National Park (Poland)

Piotr Krzan, Tatra National Park, Poland, pkrzan@tpn.pl
Maria Król, Tatra National Park, Poland
Stanisław Zięba, Tatra National Park, Poland
Magdalena Sitarz, Tatra National Park, Poland
Tomasz Zwijacz Kozica, Tatra National Park, Poland
Antoni Zięba, Tatra National Park, Poland
Szymon Ziobrowski, Tatra National Park, Poland

The Tatra National Park (TNP, south Poland) comprises the entire Polish part of the Tatra Mountains (200 km2), the highest and most western part of the Carpathians. In both polish and national parks, human activities are restricted to especially designated areas, such as hiking and skiing trails or climbing areas. The rest is protected as nature reserves; access to them is allowed only with special permit from the national park administration; however, illegal trespassing is quite common. Particularly in TNP, human influence is really high, with about three million tourists visiting the park every year (data from TNP).

Almost since the beginning of the Tatra National Park, visitor monitoring has been an important issue. Initially, it was mainly based on direct counting and only supplemented with research surveys. Since 1993, most of the information on tourist traffic in the Polish Tatra Mountains comes from the sales statistics of admission tickets to the park and the cable car to Kasprowy Wierch. The first attempt at using state-of-the-art technology for visitor monitoring in the TPN was made in the winter of 2006/2007, when automatic cameras were installed for that purpose. In the summer of 2007, infrared pyroelectric counters were first used to determine tourist traffic on hiking trails.

The accuracy of the pyroelectric sensors was further verified on some of the routes on which the sensors were mounted. The verification was carried out several times by direct observers who assessed the scale and distribution of tourist traffic. Despite the high performance achieved under experimental conditions and guaranteed by sensor manufacturers, there are several limitations in terms of their practical use in the field for visitor monitoring, especially in high mountain environment, above timberline. In the case of visitor monitoring with the use of automatic cameras, more accurate results are obtained if they are programmed to video recording rather than picture taking. However, the inability to register quickly moving people and objects must still be considered.

In 2015, the Tatra National Park used pyroelectric counters to assess the intensity of tourist traffic in two valleys which are visited by huge number of tourists each summer season. In theory, the pyroelectric counters are also capable of counting any quickly moving persons or those who stay close to others. The system was also able to collect data regarding the number of people moving in each direction.

In both valleys, 2 counters were placed close to each other (at about 0.5 m apart) and were set to the "counting crowd" mode. They gathered data (tourist count) for 6 months between 21 April and 18 October 2015. The data collected using pyroelectric counters were compared against the number of tickets sold at the each of the entrances to the valleys.

The applied method was based on the assumption that pyroelectric counters placed at two valleys (Kościeliska and Chochołowska) of similar nature should show similar daily counting lapse. Data from ticket sales reports from the Kościeliska valley were used to calibrate counters placed just over the entrance points and to estimate the lapse (error) for the number of tourist walking on the road in the valley. The same lapse (error) was used to calibrate the counters at the Chochołowska valley. In addition, since ticket sales for the Chochołowska valley are not managed by the Tatra National Park authorities and only monthly ticket sales reports are available, those assumptions were used to estimate the number of tourists entering this valley on daily basis.

In the summer of 2014, GPS Loggers were used within the scope of a supplementary project to a large tourist-related research project during which the area of the Kasprowy Wierch summit was studied. Since Kasprowy Wierch summit may be reached by cable car accessed at Kuźnice, it is an area with high numbers of visitors. The research was to show the distribution of people who use the cable car to reach Kasprowy Wierch and to return to Kuźnice. 100 devices were distributed among the visitors and they were asked to carry them while in the Tatras. The collected data allowed showing patters of tourist use of the area around the Kasprowy Wierch summit, and it can be used for any future tourist-related research.

Between 2013 and 2015 automatic cameras were used in several locations throughout the Tatra National Park, in the areas closed to tourists. Cameras were placed on forest roads, former walking paths (which are officially closed), paths and places frequented by wild animals. If any carrion was found, cameras were installed in those locations. At first, the principal objective was an attempt at assessing illegal human penetration of any area closed for tourism. However, in the course of collecting movies and photos from the cameras, the project was extended to include wildlife monitoring and specifically the gathering of information about rare animal species such as brown bear, wolf, lynx and wild boar. During the abovementioned period about 5, 000 data entries (both movies and photos) were collected, with most of them documenting human presence in the areas closed to tourists (about 3,600). Most of the wildlife entries documented deer, fox, marten and other common species, but there was also some documentation of all the three large predators: brown bear, wolf and lynx living in the Tatra National Park. Naturally, the highest illegal human traffic was documented in the most easily accessible areas such as forest roads and the officially closed walking paths which are still in good condition. Some illegal human activity was also documented in the core zone of the Tatra National Park, which is of crucial importance for wildlife and nature protection. Fototraps can monitor both illegal human traffic (illegal tourism) and wildlife at the same time.