Visitor monitoring with time lapse trail cameras

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Introduction

More and more protected areas are maintained and managed by non-profit organisations. In order to develop and implement e.g. specific management plans, knowledge about user groups, their behaviour and number are required.

The collection of this information and personnel for extensive surveys or mechanical counting devices are usually too costly for non-profit organisations. Therefore, they search for affordable alternatives to collect data on visitors and visitors' flow.

In a Lower Austrian part of the Wienerwald Biosphere Reserve, trail cameras have been purchased to document the user's activities for one year.

Method

To prevent vandalism and theft of the devices the cameras were installed as unobtrusive as possible in wooden nest boxes (mounting on trees) or in a moisture-proof junction box (mounting on a light pole). Moreover, to reach the widest possible view, the cameras were mounted at a height of about 4-6 meters. This, however, made the assembling itself and the on-going maintenance of the cameras difficult.

The cameras and camera housings had to be positioned in the boxes in such a way that changing of memory card and batteries could be done as fast as possible and without changing the set of the adjusted shooting angle and camera position (Figure 1).

Figure 1: Different boxes to camouflage the cameras (Czachs, C.)

The videos were recorded on SD cards (Secure Digital Memory Card) with a capacity of 32 GB (gigabytes). The camera settings - switch off at dusk, recording interval 20 seconds - allowed to save video files for a period of three to four weeks depending on a day-length and daylight. Therefore, the SD cards as well as the batteries were changed and replaced in the course of an interval of three to four weeks.

Challenges and problems

Difficult mounting conditions & intensive maintenance

The mounting height made it necessary to use an extension ladder as well as security rope. At least two people were necessary to perform the on-going maintenance. To avoid theft and vandalism, it was tried to do maintenance without attracting attention in the early morning hours (6:00 - 9:00 am). The necessary equipment was transported by car, so an inconspicuous maintenance was a challenge. The mere bearing of a ladder already attracted the attention of visitors.

Data- & picture failures

Problems with the cameras and the camera software occurred. Two out of six cameras had a 4-week data failure because of a software error. Data failure was also caused by fogging or freezing up of the camera lens or the housing.

Furthermore, snow on the branches of the trees or strong winds caused obstructions of the cameras view and the recordings of days or even longer periods could not be analysed.

Due to the maintenance intervals, view-obstructing objects were noticed only after one collection unit.

Data quality & evaluation

The legal framework in Austria provides that persons on the videos are not identifiable (Austrian Data Protection Authority, 2014). Therefore, the camera resolution had to be kept low.

Therefore, the identification of e.g. specific activities of visitors that took place in a greater distance to the camera proved to be difficult.

Furthermore, fogging of the lens and backlight caused problems when analysing the videos and so evaluation of the recordings took more time than expected. Often visitors and/or activities could be identified only after repeated watching.

Especially user groups that moved quickly (e.g. bikers) were in parts only visible as a "blurred shadow". By changing the recording interval of one camera from 20 to 10 seconds, we improved the recording quality of cyclists. This also meant that this camera had to be serviced more frequently (2-3 weeks intervals).

Theft & vandalism

Especially the camera located on a popular viewpoint was hard to disguise. Because of the widely visible position, the maintenance activities attracted curious glances. Furthermore, the camera had been stolen once and the replacement of the nesting box with a locked key box didn't prevent vandals from spraying colour on the camera lens.

Results and Discussion

Currently the collected video material is still in evaluation; therefore the results hitherto focus on the methods used.

In terms of acquisition and personnel costs the selected monitoring method provides a low priced alternative to conventional visitor monitoring methods like counting or mechanical counting devices.

The user activities can also be investigated for a longer period, which would not be feasible with personnel carrying out manual counts.

However, due to the limited storage capacity and battery life the cameras were intensive in maintenance. With some adjustments, such as larger memory cards and other power sources as e.g. batteries in combination with solar chargers, maintenance intervals could be extended. Though, with longer intervals of maintenance e.g. branches blocking the sight of the camera would be undiscovered for a longer period of time and data failures would be extended.

The quality of the gained data is dependent on the prevailing weather conditions and lighting conditions, the influence of the camera position and the recording direction is minor.

The reliability of the cameras regarding the recording of data is dependent to some extent on uncontrollable factors. Especially vandalism and theft play an important role in this context.

In conclusion, the method chosen is therefore suitable for carrying out visitor monitoring projects. In order to make the evaluation more efficient, the image quality should be as high as possible or allowed.

References

Österreichische Datenschutzbehörde, 2014. Meldung beim Datenverarbeitungsregister. [Online 30 03 2014]
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