Use of a Mobile Data Application to Monitor Law Offense Cases at Black Forest National Park

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Introduction

Protected area managers aim to better understand visitors and their behavior. Besides traditional methods like surveys and observations, the use of ICT increased in the last years. Counting devices are adopted to count (Arnberger, Haider and Brandenburg 2005), GPS trackers are used to track routes (Taczanowska, Bielański, Gonzalález, Garcia-Massó and Toca-Herrera 2017) and voluntarily provided online data is used to analyze visitor experiences (Walden-Schreiner, Leung and Tateosian 2018).

Here, we present a case study of Black Forest National Park in which we customized the application CyberTracker to collect data on law offense cases. With the rise of applications on mobile devices used by park rangers to track species in a protected area, the possibility arose to use such a tracking application also for visitor monitoring.

The CyberTracker application

The CyberTracker application (www.cybertracker.org) is an efficient GPS field data collection tool.

Originally the application was developed to enable non-literate trackers being involved in animal tracking (Liebenberg, Steventon, Brahman, Benadie, Minye, Langwane & Xhukwe 2017). Its customization to the individual project requirements, i.e. the data to be recorded and the user navigation, does not require programming skills. Collected data can be easily reviewed and analyzed in tables, maps and diagrams on a desktop PC. Several data formats are available for data export. Although we operate a central server-based PostgreSQL-database for data storage and a combination of R and QGIS for data analysis, simple analysis is provided within the desktop version of CyberTracker.

Besides being an efficient application to collect field data, CyberTracker's biggest advantage is the fact that it provides a development platform to customize the application according to the individual requirements of each protected area of operation. Screens may be composed easily on a GUI and subsequently installed as new application onto a mobile device, such as smartphone or tablet. Screen elements include text, images and registration widgets for audio, photo or video sequences. The position of the collector will automatically be acquired through the onboard GPS device of the mobile device. Offline maps may be included for orientation in areas without network coverage.

Black Forest National Park implementation

In many protected areas various groups of personnel range the areas due to their assigned duties. Above all rangers of protected areas spent most of their working hours in the field. Hence, there is a huge number of potential field data to be collected while carrying out the assigned field duty. In order to be effective, it needs to be adapted to the special requirements

of the protected area of operation. Thus the application needs to be flexible in design without requiring deep IT-knowledge. For this reason we opted for the application CyberTracker. Within Black Forest National Park, CyberTracker originally was meant to supplement the systematic ecological monitoring programme at permanent sample plots and allow for data collection of random observations. Soon the idea emerged to use CyberTracker also to monitor law offense cases. Each record logs additional information including a time stamp, geoposition, weather conditions and the name of the operator.

While designing the data collection navigation, the main concern was to minimize the number of clicks necessary to compile a data collection record in order to keep the tracking process feasible and coherent across trackers (see Figure 1 for the user guidance in CyberTracker for logging an observation).

First results and outlook

Following a period of design and evaluation March 2017 until May 2018 was the first pilot period of operating the CyberTracker system in the Black Forest National Park. Nearly 1.000 law offense cases were recorded during this first year. Preliminary evaluation of the collected data shows highly interesting distribution patterns. The distribution of law offenses cases is as follows: swimming (0%), car driving (8%), campfire (4%), unvalid permit (4%), dog unleashed (20%), garbage (7%), overnight stay (2%), vandalism (3%), collecting fruits (3%), and off path system (42%). The distribution of these patterns as well as the spatial and temporal distribution is of great use for park management such as adapting visitor information and visitor guidance. With regards to the objectives of the rangers the collected data throughout the years will assist to evaluate the effectiveness of visitor information and law enforcement in protected areas. It will assist park management to optimize the efficient control the vast area of the National Park with the limited resources of personnel.
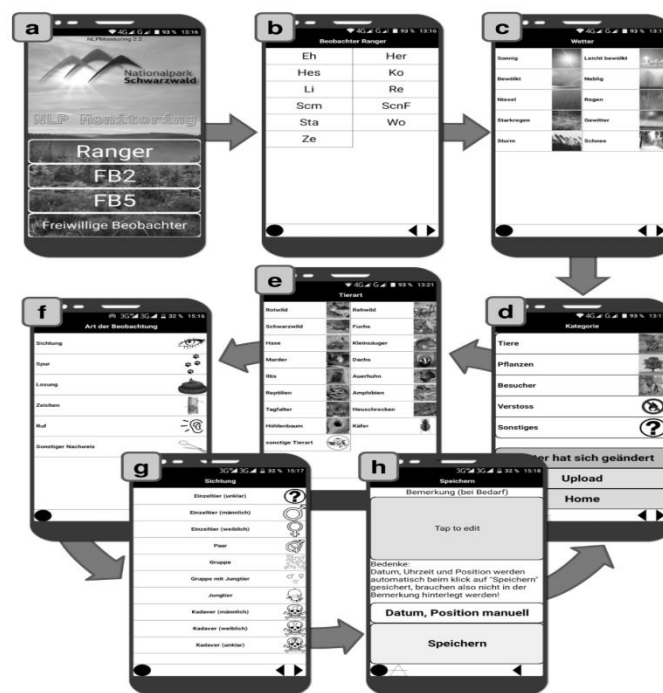

Figure1: User guidance in CyberTracker for logging an observation.

References

Arnberger, A., Haider, W., and Brandenburg, C. (2005). Evaluating visitor monitoring techniques: A comparison of counting and video observation data. *Environmental Management*, 36 (2), pp. 317-327.

Liebenberg, L., Steventon, J., Brahman, !N., Benadie, K., Minye, J., Langwane, H., and Xhukwe, Q. (2017). Smartphone Icon User Interface design for non-literate trackers and its implications for an inclusive citizen science. *Biological Conservation,* 208, pp. 155-162.

Taczanowska, K., Bielański, M., González, L., Garcia-Massó, X. and Toca-Herrera, J. (2017). Analyzing Spatial Behavior of Backcountry Skiers in Mountain Protected Areas Combining GPS Tracking and Graph Theory. Symmetry, 9 (12), pp. 317-.

Walden-Schreiner, C., Leung, Y., Tateosian, L. (2018). Digital footprints: Incorporating crowdsourced geographic information for protected area management. *Applied Geography*, (90), pp. 44-54.