

# Camping on previously unused sites in Fagus forests: Analyzing impacts from different amounts of use to inform visitor management

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## *Background*

In the German national park Kellerwald-Edersee new backcountry campsites were designated in 2009. This was a new approach, as the core zones of German national parks are usually off limits to visitors or are only accessible by dirt roads used for forest management. Thus, the need for research on possible impacts and appropriate management options was a main concern of conservation stakeholders.

Impacts from camping have been studied since the 1960s. A multitude of studies showed have showed that most of the impacts occur at the initial stage of use (e.g. Cole, 2004). But as of date, most research has been done on campsites already in use (Cole and Monz, 2004). Thus, research on previously unused sites is of special importance. Only by studying previously unused sites it is possible to gain further insight in the use-impact-relationship at the beginning of the use history of a site. Furthermore, results from previously unused sites could inform visitor management to decide on acceptable levels of change as well as appropriate management options for newly designated sites.

## *Methods*

Not only is this study unusual in its focus on previously unused sites, it also employs a research design using a regulated scheme of camping intensity to conduct a quasi-experimental camping study. The study focused on impacts on vegetation and soil and did not address other possible impacts, e.g. impacts on wildlife. Furthermore, appropriate management options were analyzed and proposed to the park management.

Based on existing campsite impact assessments (e.g. Marion, 1991; Leung and Marion, 2000) a multi-parameter-approach was employed. Accounting for the characteristic of the study area an adapted set of parameters was defined. This parameter set comprised visual impacts, indices on vegetation, soil and organic litter. Furthermore, hemispherical photography was used to measure understorey light conditions and to define canopy cover classes. Photopoint monitoring was used to document additional changes. Images were used for visual campsite assessment and were not analyzed using software (c.f. Monz and D’Luhosch, 2010)

Campsite use was only possible by registering with the national park administration. Thus, visitor numbers were provided by the park administration and visitor use-levels were calculated as visitor nights per year.

Prior to any use of the 12 campsites used in this study, baseline data were gathered. The defined parameters were collected on a total of 240 permanent sampling points. From 2009 to 2012, the parameters were monitored twice a year on the sites as well as on control sites in the vicinity of each campsite. To account for the impacts from different amounts of use, a scheme of camping intensity defined four classes of campsites with different use-levels.

### *Results and discussion*

Results from this study show significant impacts on vegetation cover and cover of organic litter. Results show no impacts on depth of organic litter, soil compaction and soil moisture. No damages to trees were recorded. Photo monitoring showed impacts on the composition of the organic litter. Furthermore, impacts on campsites with different canopy cover classes are compared. Results indicate that the loss of ground vegetation cover was a function of canopy cover class. Analyzing the results by canopy cover classes combined with use-level classes allowed for more detailed interpretation.

### *Management implications*

The studied parameters as well as the applied methods were analyzed in order to build a reduced set of parameters as a basis for long-term monitoring of the campsites. A crucial criteria in building this parameter set was the capability of the park management to conduct these future activities. Further recommendations for a monitoring scheme by the park management are given.

Campsite management options comprise, amongst others, defining number of campsites and establishing a maximum use-level as well as the spatial management instruments of concentrating, dispersal or rotation (see Cole, 1981; Marion, 2003). With regard to the study area and the associated impacts concentrating use was identified as the best management option. Detailed recommendations for the future visitor management of the backcountry campsites are given.

### *Conclusion*

The results could contribute to basic understanding of camping impacts in Fagus forests. As research on campsite impacts is limited in Europe, the results of this study could also provide comparative data for the numerous findings on campsite impacts generated elsewhere. Results also add to the knowledge of the relationship between amount of use and intensity of camping impact in general. Combining long term monitoring and adaptive management options, the park management will in future be able to control resource conditions of the new established backcountry campsites.

### *References*

- Cole, D.N. (1981), "Managing Ecological Impacts at Wilderness Campsites: An Evaluation of Techniques", *Journal of Forestry*, Vol. 79 No. 1, pp. 86–89.
- Cole, D.N. (2004), "Impacts of Hiking and Camping on Soils and Vegetation: a Review", in Buckley, R. (Ed.), *Environmental impacts of ecotourism*, CABI Publishing, Wallingford, pp. 41–60.
- Cole, D.N. and Monz, C.A. (2004), "Spatial patterns of recreation impact on experimental campsites", *Journal of Environmental Management*, Vol. 70 No. 1, pp. 73–84.
- Leung, Y.-F. and Marion, J.F. (2000), "Recreation impacts and management in wilderness. A state-of-knowledge review", in Cole, D.N., Mc Cool, S.F., Borrie, W.T. and O'Loughlin, J. (Eds.), *Wilderness science in a time of change - Vol. 5: Wilderness ecosystems, threats, and management*, Proceedings, Missoula, MT, May 23-27, 1999, U.S. Department of Agriculture, Forest Service Publications, Ogden, UT, pp. 23–48.
- Marion, J.L. (1991), *Developing a Natural Resource Inventory and Monitoring Program for Visitor Impacts on Recreational Sites: A Procedural Manual*, Natural Resources Report NPS/NRVT/ NRR-91/06, U.S. Department of the Interior, National Park Service, Denver, Colorado.
- Marion, J.L. (2003), *Camping Impact Management on the Appalachian National Scenic Trail*, Harpers Ferry, WV.
- Monz, C.A. and D'Luhosch, P. (2010), "Monitoring campsite conditions with digital image analysis", *International Journal of Wilderness*, Vol. 16 No. 1, pp. 26–31.