Spatio-temporal Patterns of Mountain Bikers in the UNESCO Wienerwald Biosphere Reserve

Hemma Preisel, University of Natural Resources and Life Sciences, Austria, hemma.preisel@boku.ac.at
Arne Arnberger, University of Natural Resources and Life Sciences, Austria
Harald Brenner, Biosphärenpark Wienerwald Management GmbH, Austria

Introduction

Sincemany years, mountain biking has become a popular activity. In the late 1990s, more than 800 km of mountainbike trails werelaid in theWienerwald, Lower Austria and Vienna. Since then the demands of mountainbikers have changed, because besideshardtail mountainbikes, downhillbikes and fullsuspensionbikeshave also gained importance. In the last few years various non-designated single trails in and around Viennahave become popular and many off-trail areas (areas with illegally built ramps and jumps by the users themselves)have developed.Interviews (e.g.Reimoseret al., 2008),observations (Arnberger and Eder, 2007) and analysisof available online GPS-user data (e.g. heat maps) show that non-designated trailsare sought out by mountainbikers.

Since 2014, various stakeholders (representatives from forest owners (Austrian Federal Forests, the forestry authority of Vienna, StiftKlosterneuburg)and mountain bikers (from the association Wienerwald Trails, Wienerwald Tourism and Wienerwald Biosphere Reserve)have decided to work together to develop mountain biking in a sustainable way according to the goals of the WienerwaldBiosphere Reserve(Koeck and Brenner, 2015). For example, first outputs of this platform can be seen in the transformation of a former illegal downhill trail area in Weidlingbach (near Vienna) into a legal trail.

A visitor management project analyzed the temporal distribution and theintensityof use of mountain bikers at designated and non-designated routes of the Wienerwald Biosphere Reserve. Results of this monitoringbuild a basis for an effective management of mountainbikers and provide basic data for evaluating the acceptability ofthe new trail area.

Study Area

The WienerwaldBiosphere Reserve extends across the two federal provinces of Vienna and Lower Austria. Area size is about 1050 km^2 andit is bordered in Vienna by settlement areas. UNESCO Biosphere Reserves are divided into three zones, namely transition zone, buffer zone and core area. Areas within the Biosphere Reserve 37 are designated ascore zones, in which nature protection and not forest management is the primarily goal. Nevertheless it is still possible to visit core areas along officially marked hiking, biking and horse riding trails.With of exception of one trail, all monitored trails lead through or pass along the border of a core zone.

The Biosphere Reserve represents a popular and highly frequented recreational area,especially in the surroundings of Vienna. Different user groups visit theW-

ienerwald for their recreational activities. Between the various user groups as well as between nature conservation interests and user groups, conflicts exist (Arnberger und Eder, 2007, Hirnschallet al., 2012, Reimoseret al., 2008, Reimoseret al., 2012).

Methods

On behalf of the management of the WienerwaldBiosphere Reserve, four trails were observed for a period of one year and information such as frequency of use and temporal use pattern of mountainbikerswas gathered. The permanent counting was doneby electronic counting deviceswhich were installedat designated and non-designated trails in and around Vienna. The counting devices, threeinduction loops and a tube sensor,counted only the cyclists.The anonymously countingwas performed fromJune 2015 to June 2016. The data was downloadedtwice a month, transferredinto a database and checked for plausibility.

Results

The following results are based on the data collected during the period fromJune 2015 to the end of March 2016. Mountainbikers use the trails throughout the year; the highest frequency of use took placebetween June and November and on days around Christmas. Three trails(onelegal and two illegal) show similar day usepatterns. ($r=0.7$-0.8; $p<0.01$). The countersregistered the maximum number of mountain bikers not only in the official mountain bike trail, but also in the two illegal trails. In SeptemberandNovember,the highest numbers of users was registered in one of the two illegal trails. Only the off- trail area, suitable only for experienced users, showsdifferent use patterns: Comparatively relatively few mountain bikers used the offtrail area; but the number of users was rather stable over the whole monitoring period. In all the trails, maximum number of mountainbikers wereregisteredon Sundays and public holidays. The daily-use patternsvary predominantly between the seasons. During the warm season, the peak occurs during the morning and evening hours;in winter and spring however, between 10AM to 4 PM. In the off-trail area, the peak occurs in the afternoon which is different from the other trails.

Conclusion and Outlook

The seasonal distribution shows that mountain bikers use the Wienerwaldthroughout the year, whereby the extremely mild beginning of the winter and the mostly snow-free winter has favored this distribution. Main conclusionsof the monitoring are:

- Daily activity patterns show that mountain bikers change their activity times during the year.
- As legal trails and illegal trails show similar use patterns, it can be assumed that bikers bike where trails are attractive.
- Very experienced bikers with good skills go biking regardlessof the season.
- Daily use patterns show that mountain bikers use the trails in the mornings and in the evenings as well as in winter. Thus the BikerFairplayrules (for mountain bikers in the Wienerwald) are still not accepted as mountainbiking is forbidden during these times of the day(Reimoseret al. 2008).

This evaluation provides an important basis for further management and monitoring ofmountain bike trails in the Wienerwald Biosphere Reserve and other recreational areas: Illegal trails should be identified and intensity of use should be monitored. Then they can be compared to legal trails in the surroundings and adequate management measures can be implemented.

Actually one of the illegal trails in the study area has been transformed into a legal trail. Continuous monitoring would help evaluatethe effects of the legalization of the trail and answer the question:In what way does theintensity of use on designated and non-designated trails change?

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