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Exploring Spatial Behaviour of Individual Visitors as Background for Agent-Based Simulation

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Introduction

Computational modelling and simulation gain increased importance as tools supporting planning and management of visitor flows in natural recreation sites. The agent-based approach focuses on modelling behaviour of individual artificial agents operating in a virtual environment. In order to set adequate model parameters and to produce reliable outputs, generic assumptions and theories concerning human spatial behaviour and recreational experience require validation against the real phenomena (Cole 2005, Elands & van Marwijk 2005, Gimblett et al. 1996, Skov-Petersen 2005). Within this context, the paper addresses the question of how individual visitors use recreational space. The aim of this study was to characterize spatial preferences of individual recreationists and to define visitor profiles corresponding to their spatially manifested acts. The case study area – the Lobau – is a heavily used, peri-urban recreational site, situated within the city borders of Vienna, Austria and is a part of the Danube Floodplains National Park.

Methods

On-site visitors were interviewed about their outdoor activities, visiting motives, length of stay, local knowledge, etc., at main entrance or intersection points on randomly selected days. As part of the on-site interviews, respondents were asked to mark on a map (1:25.000) the route that they took on that day (Arnberger et al. 2000). The sample size was 532. Additionally, detailed data covering environmental features of the area were collected. Following, numerous attributes of the routes were derived from the interrelated data. Those comprised physical features of the environment, route geometry and topology as well as spatial information provided on site. In the first step, the route attributes were explored using basic statistical methods. Next, cluster analysis was applied to identify groups of visitors with similar spatial behaviour. For data storage and analyses GIS, relational database management and statistics software packages were used. Figure 1 presents the methodology used in this study.

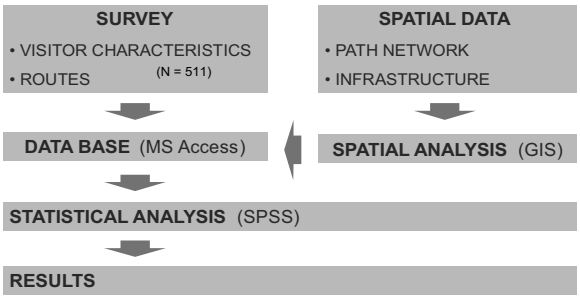

Figure 1: Methods used for analysing route profiles.

Results

The results demonstrate the great diversity of routes respondents took or planned to take during their visit to the Lobau. Reported trips ranged from long-distance loops, following marked and well paved trails, up to the destination-oriented shortcuts leading from a parking place to the nearest picnic or swimming spot. Selected attributes of routes have been presented below, more details can be found in (Taczanowska et al. 2006). In terms

Table 1: Typology based on spatial behaviour of the Lobau visitors.

Selected attributes of routes	Classical visitors	Speedy visitors	Off-trail users
Share of the sample (N=532)	59 %	31 %	10%
Dominating trail surface	gravel	asphalt	unpaved
Dominating trail width	middle	wide	middle / narrow
Signage (mean value)	85.1 %	89.9 %	53.8 %
Length of route (mean value)	6.6 km	9.1 km	3.1 km

of distances travelled, the mean value of the route length was 7.0 km. The shortest distance reported in the Lobau was 163 meters long, the longest one: 25.7 km. Generally, two types of route shapes were distinguished: a loop and traverse. The large majority of the respondents finished their trips in starting locations, making loops (80%). More than a half of recreationists (52%) did not retrace their paths, however considerably large share of visitors partly (32%) or totally (16%) repeated the trail on their way back. In most cases (52%), the respondents followed exclusively the marked trails. About ten percent of the interviewees were predominantly off-trail users. The visitors tended to use prepared and well maintained paths. Gravel and asphalt surfaces were most willingly used among the Lobau visitors while performing different types of recreational activities. Three general types of spatial behaviour among the Lobau visitors were identified: classical visitors, speedy visitors and off-trail users (table 1). Table 1 presents selected characteristics of the defined types.

This study delivered practical information on how individuals use a recreational setting and contributed to better understanding the human-environment interactions. The analysis revealed that there was no straightforward way to derive information on spatial behaviour from the demographic characteristics. The findings of this research might be a valuable basis for creating, testing and calibrating computational models of recreational use.

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