

# Past On-Site Experience, Crowding Perceptions, and Use Displacement of Visitor Groups to a Peri-Urban National Park

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**Abstract** Past on-site experience was linked to the crowding perceptions and use displacement of 383 on-site visitors to the peri-urban Danube Floodplains National Park, Austria. Three visitor groups were determined according to their area experience: local residents from Vienna and rural communities, having the highest level of experience; regional visitors from the city and eastern Austria; and tourists from Austria and abroad with the lowest degree of experience. Crowding perceptions were significantly different across the user groups. More than 50% of local residents perceived the national park as crowded, whereas only 27% of regional visitors and 19% of tourists reported such an evaluation. Even among local residents and regional visitors, respondents with more on-site experience expressed a greater impression of a crowded park. Differences in crowding evaluations between local rural and urban residents and between regional rural and urban visitors were not found. For 27% of local residents and 15% of regional visitors, use levels were so unacceptable that they displaced temporally and spatially, whereas use displacement was relatively irrelevant for tourists. The use displacement strategies involved differ among the three user groups. Management implications were

discussed, taking the specific situation of the small national park on the urban-rural fringe into consideration.

**Keywords** Past experience · Crowding · Local residents · Park-based tourism · Regional visitors · Use displacement

## Introduction

National parks on the urban–rural fringe provide many benefits to society. Such peri-urban protected areas are places for outdoor activities, refuges from hectic city life, and valuable habitats for wildlife. At the same time, these parks are confronted with high use pressure because of the large number of residential areas in relatively close proximity to the park. Crowding perceptions and use displacement of park visitors may become prominent issues for area management. Peri-urban national parks are visited by local residents, visitors from the region, and park-based tourists. This visitor structure is characterized by user groups with completely different degrees of park-use history, ranging from regular daily visitors to first-time tourists. Therefore, past on-site experience (Hammit and others 2004; Kuentzel and McDonald 1992; McFarlane and others 1998; Watson and others 1991) may play an important role in the evaluation of crowding and in the application of use displacement as a result of crowded situations. Despite the relevance of the concepts of crowding and use displacement for the park management, there is a knowledge gap about the influence of past experience on crowding perceptions and use displacement in the context of a heavily used peri-urban national park.

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## Crowding

Most research on the crowding perceptions of on-site visitors has been undertaken in remote and lightly used national parks and wilderness areas in the United States. The majority of these areas are characterized by a fairly homogeneous visitor structure (Graefe and others 1984; Stewart and Cole 1999) and high shares of first-time visitors. Empirical studies in these areas have documented that repeat, or more experienced, on-site users reported greater crowding perceptions, in particular when current use levels exceed those of the past (Ditton and others 1983; Manning 1999; Vaske and others 1980), whereas first-time visitors and inexperienced national park users were more tolerant of crowds (Graefe and others 1984).

Knowledge about the crowding perceptions of the diverse set of mostly regular, even daily, visitors to a peri-urban national park, however, is limited. In Europe, particularly in Central Europe, hardly any research on the crowding perceptions of national park visitors has been undertaken. A few studies in Scandinavian countries (e.g., Fredman and Hörnsten 2001; Kaltenborn and Emmelin 1993; Saarinen 1998) are exceptions. This is surprising, because most national parks in Central Europe lie within easy reach of urban areas and are often surrounded by large urbanizations. The lack of legal stipulations, such as the US Wilderness Act from 1964, which established solitude as a fundamental recreational aspect, may be one reason for the low interest in crowding issues in Central Europe. Another might be the generally lower interest in the social, compared to ecological, aspects of recreational activities.

The neglect of research on residents' crowding perception is also evident in the scarce literature on peri-urban tourism (Weaver and Lawton 2001), whereas in typical tourist destinations, perceptions of crowding have been among the most frequently examined issues. Local residents see crowding in public spaces and recreation areas as a factor reducing their quality of life (Brunt and Courtney 1999; Teye and others 2002), in particular if tourism leads to the displacement of the local population from traditional recreation areas (Lankford and Howard 1994; McCool and Martin 1994; Williams and Lawson 2001).

## Use Displacement

In conditions of crowding, humans activate compensatory measures. Researchers have used the concept of coping to describe visitors' reaction to crowding.

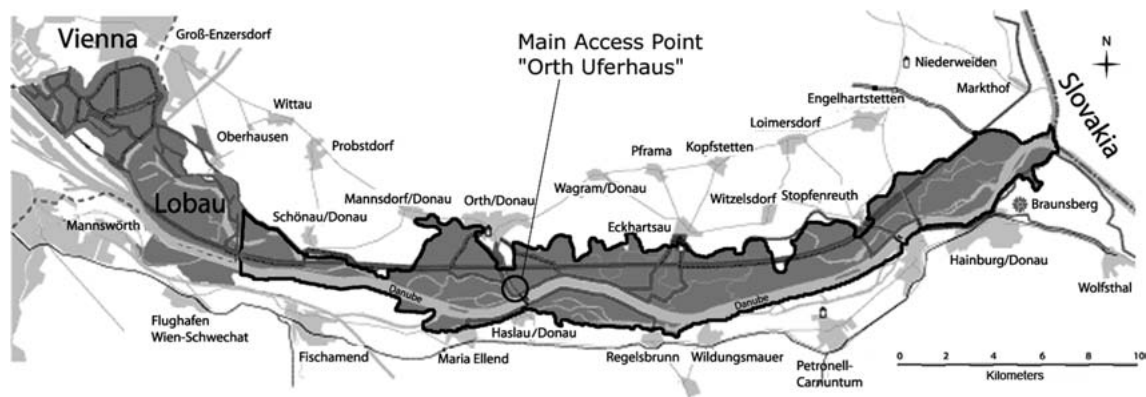
Displacement is one of the coping mechanisms visitors apply to reduce stress (Manning 1999). In addition to physical avoidance, literature in outdoor recreation has identified two cognitive mechanisms: product shift and rationalization (Schneider and Hammitt 1995). Because of the investment involved in coming to the area, rationalization is applied to reduce internal stress by reporting higher levels of satisfaction regardless of actual use conditions. Product shift suggests that visitors who experience higher use levels than expected or preferred may alter their definition of the recreation they were seeking.

Several types of use displacement have been observed (Manning and Valliere 2001); spatial displacement occurs when visitors shift their use to other locations within the same area (intraspatial) or move away to other areas (interspatial). Temporal displacement occurs when visitors change the time of their visits, and activity displacement occurs when visitors change their primary activity. Use displacement has been investigated for several areas and activity types (Hall and Shelby 2000; Shelby and others 1988). Manning and Valliere (2001) found that residents living near the Acadia National Park implemented relatively high levels of coping behaviors as a result of crowding and user conflicts.

The concept of recreation substitutability, where visitors might be able to satisfactorily substitute activities, areas, or times seems to be related to use displacement (Brunson and Shelby 1993; Ditton and Sutton 2004; Manning 1999). When national park visitors choose temporal, resource and activity substitutes to retain their original recreation experience within the area, park managers must know about these and their possible impacts on the park and its wildlife.

## Past Experience

Both place of residence and previous experience in the area can play important roles in the way an individual perceives and evaluates a particular environmental setting (Ewert 1998). Past experience or, similarly, the concept of Experience Use History (Hammit and McDonald 1983; Hammit and others 2004), refers to the amount of use experience with a specific site, activity, or with other similar places, predominantly measured in terms of the frequency of visits and total years of use. Past experience indicates that experienced users have a greater knowledge base concerning activities and/or resources, are more familiar and, therefore, have a richer cognitive, and perhaps affective, basis for evaluating recreation settings (Hammit and others 2004). It has been demonstrated that past



**Fig. 1** The Danube Floodplains National Park and the national park region (the Lower-Austrian section of the park is outlined in black)

experience is an indicator for user perception and preferences, site choice behavior and place bonding, and is associated with recreation resource management (Hammit and McDonald 1983; Hammit and others 2004; Kuentzel and McDonald 1992; McFarlane and others 1998; Schreyer and others 1984; Watson and others 1991). In some studies, recreation experience has been related to actual crowding, and there seems to be a relationship between the amount of past experience with one resource and reported crowding (Armistead and Ramthun 1996; Ditton and others 1983; Graefe and others 1984). However, attention to the role of experience levels in the reporting of crowding has been minimal, particularly in the urban context.

#### Relevance for the Management of the Danube Floodplains National Park

Information about crowding perceptions and use displacement behavior of the principal visitor groups is required as one important source of guidance (Stewart and Cole 2003) for the management of the peri-urban Danube Floodplains National Park in Austria. The park, with an area of only 9300 ha, is situated between two capital cities, Vienna and Bratislava and is one of the few attractive recreation areas in the region. Because of the existing pressure from 1,000,000 annual visits, many entry points, free and unlimited access, the intense trail network fragmenting the park, its narrow, elongated shape (Fig. 1), and the lack of buffer zones around it, there are only a limited number of rest areas and rest periods for wildlife including ungulates and wetland-based avifauna (Wagner and others 2005). This already heavily used park will be confronted with increasing use

pressures in the future. In the neighboring residential areas, housing developments proceed rapidly, increasing the already high number of local residents. Efforts to bring the capital cities closer together (Twin City Region Vienna-Bratislava) are being undertaken, resulting in future improvements to the traffic infrastructure. This will indirectly increase the attractiveness of the national park region as a commercial and residential area. Additionally, ongoing national and international advertising of the national park is attracting more park-based tourists.

#### Study Objectives

In this paper, past on-site experience is linked with crowding perceptions and use displacement of national park visitors. In contrast to past research, the study was undertaken in a heavily used peri-urban protected area with a heterogeneous visitor composition and high share of daily and weekly visitors. We propose that crowding perceptions and use displacement differ among the national park's three principal on-site user groups—local residents, regional visitors, and tourists—because of the differences in their previous experience. The research questions are whether (1) the three user groups with different experience levels have different perceptions of crowding, (2) visitors within each of the three groups with a high degree of past experience are more likely to report higher crowding perceptions than visitors with little past experience, and (3) the willingness to displace due to the crowded situation and the strategies involved differ among the three user groups. Based on the research results, management implications are derived that take the specific situation of the national park on the urban fringe into consideration.

## Method

### Study Area

The Danube Floodplains National Park extends for nearly 38 km along the Danube River and protects one of the largest natural riparian wetlands in Central Europe. The western part of the park, called the Lobau, actually lies within the municipal boundaries of the City of Vienna, whereas the eastern part, with an area of 6900 ha and a maximum width of only 4 km, is located in the province of Lower Austria. Settlements and areas of intensive agriculture and the River Danube border the park. About 170,000 people live within 6 km of the national park boundaries: about 40,000 in 13 communities in Lower Austria and approximately 130,000 in Vienna (MA66 2001, NÖ Statistik 2001).

In 1997, the Danube Floodplains were declared a national park and received international recognition as an IUCN category II protected area. Category II protected areas are managed for ecosystem protection while, at the same time, providing recreational opportunities (IUCN and EUROPARC 2000). Therefore, park managers need reliable and detailed data on park visits in order to identify management strategies that are ecologically sound and acceptable to the area users. Investigations on the recreational use of the Lower Austrian part of the national park, using 1-year visitor counting and interviews, were conducted between 2001 and 2002 (Arnberger and Brandenburg 2002).

### Data Collection

The data for the study presented here were collected in personal on-site interviews at 10 access and intersection points of the Lower Austrian part on 8 days during the months of March, June, July, August, and September. The interviews took place on randomly selected workdays and the immediately following Sunday. The four Sundays were among the 5% most-visited days of the year under observation, according to the 1-year counting because of relatively fine weather conditions. The interviewers were future national park employees participating in a course on guiding visitors through the national park. They were carefully familiarized with the questionnaires by the authors. The interviewers asked each visitor if they were willing to participate in a 10-minute interview. Once the interview was completed, the next visitor encountered, regardless of user type, was asked to take part in the study. The total sample size was 394. Questionnaires with incomplete data about crowding and past-experience variables were eliminated, resulting in 383 questionnaires for the

subsequent analysis. The refusal rate for interviews was 40%. Reasons for refusal were mostly trivial, but more systematic biases were introduced because bicyclists, a major park user-group, were less likely to stop for an interview than walkers were.

Basic demographic information concerning visitor origin, age, group size, gender, and visit-related questions including length of stay, visitor activities in the park, and visiting motives was obtained. A series of questions dealt with the role of the national park in the choice of destination. One question addressed the intended visit frequency. Visitors were asked how often they planned to visit the park in the future, compared with the present.

Depending on their origin, the park has different functions for the diverse mix of visitors. The park can serve as a part of the everyday environment for local residents, as a day-use area for regional visitors, and as a part of the travel destination for tourists. Based on their place of residence, visitors were therefore segmented into local residents coming from the national park region, including urban and rural residents, regional visitors from eastern Austria and Vienna living within 100 km traveling distance, the typical maximum distance for a day visit, and visitors from other parts of Austria and abroad.

Past experience was measured using three questions, addressing area-specific use experience: the typical frequency of visits to the park per year, whether respondents perceived themselves as regular visitors to the park, and whether they need a map for orientation in the park. One typical measure of past experience, the years of use, was not applied. We believe, however, that the perception of being a regular visitor to the park—an indirect indicator for the long-term use of the park—can be considered as an equivalent measure. Visitors were also asked about how many other recreation areas in eastern Austria they frequently use for outdoor activities. To ease the handling of this variable, a maximum of three areas was recorded, which may be a study limitation. This variable describes the visitors' reliance on the park and the presence of substitution opportunities.

Three questions focused on the topic of crowding and use displacement. Visitors were asked about their global perception of crowding in the national park using a four-point scale: the park is not at all crowded (1), the park is not crowded (2), the park is crowded at specific places or times (3), and the park is crowded overall (4). The global crowding measure extracted from repeat visitors is an aggregation of several past discrete visits whereas, for first-time visitors, this measure reflects the aggregated crowding experience

of the current visit. First-time visitors were only asked about crowding perceptions when they were about to leave the area or were interviewed within the park. The global measure was expected to be more suitable for exploring the relationship between past experience and crowding in an area with high shares of regular users. This global measure was derived from crowding research in outdoor recreation and tourism (Manning 1999) and adapted specifically to this study. Visitors who indicated crowding perceptions (3 or 4 on the scale) were asked whether they have displaced because of the crowded situation in the national park and which strategies were used.

## Results

### Visitor Characteristics

The visitor structure of the national park consisted of local residents (35% of all visitors interviewed), visitors from the region (54%), and a low share of tourists from Austria and abroad (11%). Several significant differences regarding sociodemographics and visit-related issues could be observed (Table 1). Local residents reached the park on foot, by bicycle, and by car, whereas the regional visitors came predominantly by car or motorbike. About two thirds of the tourists rode

bicycles; these were mainly Germans following an international cycle route on their tour along the River Danube. Only 6% of regional visitors arrived by public bus or train because access by public transport is sub-optimal. The average day-trip length by residents was the shortest: about 70% stayed less than 2 hours because of the higher shares of typical short-term users such as dog walkers and joggers, whereas 64% of regional visitors and 84% of tourists stayed longer than 2 hours. Asked about the role of the national park as the destination for their trip, 7% of the local residents, 9% of the regional visitors, and only 12% of the tourists said that the national park label was the reason for coming. An average of 1.4 other recreation areas, beside the Danube Floodplains National Park, belonged to the areas frequently visited by local residents, whereas regional visitors mentioned 1.7. About 60% of local residents had visited at least one other national park, whereas 73% of regional visitors and 88% of tourists had done so.

### Past On-Site Experience

An additive index of the three past experience variables was computed: Hammitt and McDonald (1983) used a similar approach, ranging from 3 to 6. Visitors with an experience index of 6 were daily visitors, perceiving themselves as regular visitors and did not

**Table 1** Visitors' characteristics depending on origin

Variable	Categories	Local residents	Regional visitors	Tourists	<i>P</i>
<i>N</i>		133	208	42	
Proportion		34.7%	54.3%	11.0%	
Gender	males	62.1%	46.3%	60.0%	0.008 <sup>a</sup>
Age	≤30 yrs	14.3%	13.6%	16.7%	0.386 <sup>a</sup>
	>30 ≤ 60 yrs	68.4%	70.9%	78.6%	
	>60 yrs	17.3%	15.5%	4.8%	
Mode of travel	On foot	27.8%	2.9%	0.0%	0.000 <sup>a</sup>
	Bicycle	31.6%	16.8%	66.7%	
	Car, motorbike, boat	40.6%	74.5%	33.3%	
	Public transport	0.0%	5.8%	0.0%	
User type	Walker	47.4%	64.4%	29.3%	0.000 <sup>a</sup>
	Bicyclist	28.6%	21.0%	61.0%	
	Dog walker	14.3%	8.3%	4.9%	
	Jogger and canoeist	9.8%	6.3%	4.9%	
	≤1 hour	13.5%	5.3%	0.0%	0.000 <sup>a</sup>
Average length of stay	>1 ≤ 2 hours	57.1%	30.0%	15.8%	
	>2 ≤ 4 hours	16.5%	39.6%	36.8%	
	>4 hours	12.8%	25.1%	47.4%	
	(% of respondents)	98.8%	92.7%	76.9%	0.001 <sup>a</sup>
Do you know that the Danube Floodplains are a NP					
Other frequently used recreation areas	Number	1.4	1.7	Not asked	0.028 <sup>b</sup>
Have you visited other NPs?	Yes	60.9%	73.1%	88.1%	0.002 <sup>a</sup>
Would you have come without the NP label?	Yes	92.5%	90.9%	88.1%	0.672 <sup>a</sup>

<sup>a</sup> Chi-square test

<sup>b</sup> Kruskal-Wallis test

NP National Park

**Table 2** Past experience variables

Variable	Categories	Local residents	Regional visitors	Tourists	<i>p</i>
I am a regular visitor to the NP Frequency of visit (6 categories)	Yes	93.2%	63.0%	11.9%	0.000 <sup>a</sup>
	Daily	29.3%	0.5%	0.0%	0.000 <sup>a</sup>
	Weekly	45.1%	13.5%	0.0%	
	Monthly or less	23.3%	69.2%	26.2%	
I need a map for orientation Past experience index (3 = min; 6 = max)	First visit (% of respondents)	2.3%	16.8%	73.8%	0.000 <sup>a</sup>
	Mean	5.46 <sup>b</sup>	4.44 <sup>b</sup>	3.37 <sup>b</sup>	0.000 <sup>c</sup>

<sup>a</sup> Chi-square test

<sup>b</sup> Mann-Whitney *U* test; significant differences at the *p* < 0.001 level within visitor segments

<sup>c</sup> Kruskal-Wallis test

*NP* National Park

rely on a map for orientation, whereas an index of 3 described first-time visitors, perceiving themselves as irregular visitors and in need of an area map (Tables 2 and 4). Because of the discussion about the use of one single index of past experience (Watson and others 1991; Kuentzel and McDonald 1992), and to determine which experience variable influences crowding perceptions, all experience variables were treated as unique, independent variables in testing our research questions.

Locals showed the highest past experience index and tourists the lowest (Table 2). Between all groups, the on-site experience index differed significantly at the *p* < 0.001 level. Most of the local residents (93%) and the majority of regional visitors (63%) perceived themselves as regular visitors to the park, whereas, naturally, only a few tourists fell into this category. Local residents had the highest visit frequency. About 30% of them were daily visitors and a further 45% came at least once a week, while only 14% of regional visitors came at least once weekly. Three-quarters of the tourists were first-time visitors. Almost 17% of the local residents needed a map for orientation, whereas 46% of the regional visitors and 81% of the tourists used one (Table 2).

### Crowding Perceptions

Perceived crowding was a definite issue in the national park, because about 36% of the respondents felt the park to be generally crowded or crowded at specific times or places. The crowding perceptions differed significantly across the user groups (Research Question 1). More than 50% of the local residents reported the park as crowded overall or at specific times or places, whereas only 27% of the urban visitors and 19% of the tourists had this impression (Table 3). Therefore, as assumed, the group with the most past experience of the area, because of the high frequency of their visits, largest

shares of regular users, and deepest local knowledge, reported the highest crowding evaluations. It is logical that not even one tourist reported a feeling of overall crowding because most were first-time visitors without the possibility of experiencing the whole area under different conditions of use. No differences in crowding evaluations between rural and urban local residents, as well as between rural and urban regional visitors, were found (Table 5).

In the next step, it was tested whether past experience was also related to crowding perceptions within each visitor group (Research Question 2). Separate univariate regression analyses were used to assess the influence of past experience on the perception of crowding for each user group (Table 4). Among both local residents and regional visitors, the greater the past experience, the more the park was judged as crowded, whereas no relationships were found for the tourists.

### Use Displacement as a Result of Crowding

Use displacement was an issue because 18% of all respondents indicated that they had modified their behavior. The willingness to displace, as well displacement strategies, differed among the user groups (Research Question 3). Almost 27% of the local population, 15% of the regional visitors, and 2% of the tourists had altered their behavior because of the crowded situation (Table 3). Among these groups with crowding perceptions, local residents (59%) and regional visitors (57%) were more likely to displace than tourists (13%). Changes in their routes or choosing alternate visiting times, such as selecting later evening or earlier morning hours or moving from weekend use to workday use, were the most common reactions. Although local residents displaced more temporally, regional visitors used inter-area use displacement to a greater extent. For regional visitors, a

**Table 3** Global crowding perceptions and use displacement of crowded visitors across visitor groups

Variable	Categories	Local residents	Regional visitors	Tourists	<i>P</i>
Crowding perceptions (mean)		2.5	2.0	1.8	0.000 <sup>a</sup>
	Not crowded at all	12.8%	26.0%	38.1%	0.00 <sup>b</sup>
	Not crowded	36.1%	47.1%	42.9%	
	Crowded at spec. times or places	44.4%	24.5%	19.0%	
I have reacted due to the crowded situation Strategies	Overall crowded	6.8%	2.4%	0.0%	
		59.3%	57.4%	12.5%	0.073 <sup>b</sup>
	Intra-area displacement	34.2%	21.6%	100.0%	
	Temporal displacement	55.3%	29.4%	0.0%	
	Inter-area displacement	10.5%	45.1%	0.0%	
Future frequency of visits	Activity displacement	0.0%	4.0%	0.0%	
	Less or no visits	3.6%	3.9%	12.5%	0.06 <sup>b</sup>
	Same	84.3%	67.6%	67.5%	
Regression analysis between crowding (dependent variable) and future frequency of visit ( $\beta/(R^2)$ )	More visits	12.0%	28.5%	20.0%	
		–.147 (.022)	*–.155 (.024)	0.028 (.001)	

<sup>a</sup> Kruskal-Wallis test

<sup>b</sup> Chi-square test

\*  $p < .05$  (regression analysis)

**Table 4** Univariate regression analyses between past experience variables and crowding perceptions (dependent variable) within each user group

Variable	Categories	Local residents		Regional visitors		Tourists	
		Beta <sup>a</sup>	$R^2$	Beta	$R^2$	Beta	$R^2$
Frequency of visits	1 = First visit; 1.2 = less than once in a month, ... 1.8 = several times a week, 2 = daily	0.239**	0.057	0.168*	0.028	0.278(*)	0.077
I am a regular visitor	1 = No, 2 = Yes	0.190*	0.036	0.188**	0.031	0.196	0.039
I need a map for orientation	1 = Yes, 2 = No	0.125	0.016	0.181*	0.027	0.126	0.016
Past experience-Index <sup>a</sup>	Regression coefficient	0.246**	0.061	0.227**	0.052	0.211	0.045

\*\*  $p < 0.01$ ; \* $p < 0.05$ ;  $p < 0.10$ (\*)

<sup>a</sup> The standardized Beta coefficient represents the direct effect of each past experience variable and the past experience index on crowding evaluations

NP National Park

significant relationship was found between the planned future frequency of visits and crowding evaluations (Table 3), whereas for the other groups this relationship was insignificant. The higher the crowding evaluations of the park, the more regional visitors intended to reduce the frequency of their future visits. Urban local residents and urban regional visitors were more likely to displace compared to rural local residents and rural regional visitors (Table 5).

## Discussion

This study provides new evidence from a type of site not previously investigated: a heavily used peri-urban park

with a heterogeneous user composition of urban and rural local residents, urban and rural regional visitors, and some tourists from Austria and abroad. The existence of user groups with different degrees of past on-site experience allows testing of whether past experience is related to crowding perceptions and use of displacement behavior. The study has demonstrated that past experience classifications are related to the crowding perceptions of on-site visitors. Even among local residents and regional visitors, respondents with more past experience expressed a greater impression of a crowded park. The results supports findings gained in more remote areas with high shares of first-time or irregular visitors and for actual crowding as an evaluative scale (Ditton and others 1983; Vaske and others 1980).

**Table 5** Differences between rural and urban visitors regarding crowding perceptions and use displacement

Variable	Local residents		<i>p</i>	Regional visitors		<i>p</i>
	Urban	Rural		Urban	Rural	
Proportion	20.3%	79.7%		65.7%	34.3%	
Crowding evaluations (mean)	2.5	2.4	0.852 <sup>a</sup>	2.0	2.1	0.790 <sup>a</sup>
I have reacted due to crowded situations	80.0%	55.1%	0.144 <sup>b</sup>	62.5%	50.0%	0.361 <sup>b</sup>
Other frequently used recreation areas	1.6	1.4	0.315 <sup>a</sup>	1.7	1.6	0.531 <sup>a</sup>

<sup>a</sup> Mann-Whitney *U* test

<sup>b</sup> Chi-square test

Use displacement as a result of crowding takes place. Several studies on different activities and settings have found displacement due to crowding, and as reported in the literature, displacement can take many forms (Hall and Shelby 2000; Manning 1999; Manning and Valliere 2001; Shelby and others 1988). The behavioral coping mechanisms applied by park visitors were temporal, inter-area and intra-area displacement. The willingness to displace and the strategies implemented differ between the three user groups, depending on visitor origin, the degree of local knowledge, and the existence of alternative areas. Thus, this study answers the question posed by Manning and Valliere (2001, p. 423) of whether local residents differ from other visitors in terms of use displacement. In addition, this study found indications for potential connections between the concept of substitutability and use displacement.

### Local Residents

Compared to the other user groups, locals have the highest past experience and the highest crowding evaluations; consequently, the greater the past experience, the more visitors are likely to report crowding perceptions. This relationship is also supported by the fact that even among local residents, those with greater past on-site experience are more concerned about crowding (Table 4). Local residents in particular depend on this national park as part of their traditional, everyday living environment, spending extended periods of time there as documented by the extremely high frequency of their visits (Table 1). The more they use the area, the more they rely on it, and the more they report crowding perceptions. High use levels may be seen by these local residents as a threat to their oft-used, personal recreational space. Several researchers (Lankford and Howard 1994; McCool and Martin 1994; Weaver and Lawton 2001; Williams and Lawson 2001) gained similar results about the feelings of residents, perceiving competition for recreational resources with tourists or day visitors.

To avoid crowded areas and times, one fourth of the locals (59% of those who perceived crowding) displace their use (Table 3). Their preferred reaction is temporal displacement, facilitated by the shorter traveling distance to the park compared to regional visitors, allowing for short-term visits in the workday evening hours or a shift from weekend to workday use. Because of their knowledge of the area, locals may also find it easier than other visitors to adopt intra-area displacement. These locals might be able to satisfactorily substitute areas or times (Brunson and Shelby 1993; Ditton and Sutton 2004). Manning and Valliere (2001) found similar results in their study about residents living near the Acadia National Park, where nearly half of the respondents adopted temporal and spatial displacement behavior.

About 10% of the locals who felt crowded use inter-area displacement. Inter-area displacement by locals represents an extreme reaction, because hardly any other alternatives exist in close proximity to their residential areas. A shift of use to other more distant areas results in high access “costs” because of the need for transport and the travel time involved. These areas seem to provide similar leisure experiences as the national park and are therefore used as resource substitutes, whereas temporal and intra-area substitutes seem to be less attractive. Alternatively, locals with inter-area use displacement behavior may have not developed such a strong sense of belonging to the park than locals with temporal or intra-area use displacement behavior.

On the other hand, use displacement resulting from crowding is not an issue for 41% of the locals who feel crowded. Those locals who perceived crowding and whose opportunity to relocate spatially and temporally is limited may accept a decrease in their outdoor recreational quality or may implement cognitive coping mechanisms. High degrees of place attachment may be one reason why they continue to come to the park or to specific places within the park even as it becomes more crowded. Other explanations for nonmodified behavior might be the lack of transport means—78% of users



who feel crowded and subsequently displace arrived by private car, whereas 67% of those who did not displace used this form of transport—time constraints, or that these locals might not have attractive, alternative recreation areas as a substitute. The latter assumption may be supported by the fact that nondisplaced crowded locals mentioned only 1.1 frequently visited areas, whereas displaced crowded locals indicated 1.4 areas.

However, place attachment, area satisfaction, and cognitive coping mechanisms were not investigated in this study, which focused on behavioral modifications. Manning and Valliere (2001, p. 424) suggest that satisfaction may be a superficial and even misleading measure for the effective evaluation of outdoor experience and that measures stressing coping behavior could provide park managers with more useful information. One can also assume that the concept of rationalization (Manning 1999) would be rather irrelevant because of the low efforts required for local visitors to come to the area.

### Regional Visitors

Regional visitors fall between local residents and tourists in regard to past experience and crowding evaluations. Similar to local residents, those regional visitors with a higher level of past experience report higher crowding evaluations (Table 4). For many of these visitors, the park serves as a habitual day-use area, and the high past experience resulted in increased crowding evaluations.

Among those regional visitors who indicated a crowded park, predominantly inter-area and, to a lower extent, intra-area, as well as temporal use displacement and, marginally, activity displacement is applied. Compared to local residents, regional visitors have more substitution opportunities in close proximity to their residence (Table 1). This is understandable, because the park is more or less the only recreation area in the region and, consequently, locals have limited substitutes, whereas regional visitors may have other substitutes closer to their home that they can use as their daily recreation area. Therefore, inter-area displacement is their predominant coping behavior, while lower local knowledge may prevent them from intra-area displacement. Compared to locals, temporal displacement is also a less preferred strategy. Regional visitors come from more distant areas and need some time to travel to the park. A shift from weekend to workday use may be constrained because of working times and would only permit a short-term visit before nightfall. Additionally, regional visitors prefer to stay longer in the park (Table 1) and, consequently, may

avoid a short-term visit in the less-frequented workday and weekend evenings. The significant relationship between the intended future frequency of visits and crowding evaluations of regional visitors documents another form of modified behavior (Table 3). Diminished outdoor recreation quality reduces the attractiveness of the park for regional visitors sensitive to crowding and also leads to a reduction in visits to the park. This future displacement mechanism is not found with locals because they may depend more on the park, are accustomed to it, and have fewer substitutes.

Activity displacement plays a marginal role as a coping strategy for regional and, particularly, local visitors. Originally, we assumed that visitors with crowding perceptions would stop cycling at heavy use times. However, with a shift alone from bicycle use to walking activities, visitors would not avoid crowded situations, but would reduce only the chance for user conflicts. Visitors may have made a precise distinction between activity displacement resulting from crowding or from user conflicts. On the other hand, bicycle use is concentrated on a linear, paved route that is not suitable for walking activities. Therefore, walking would not be a substitute for bicycling activities.

No differences in the crowding evaluations are found between rural and urban local residents as well as between rural and urban regional visitors (Table 5). Apparently, at least as shown in this case study, it is not the living environment that influences crowding evaluations; it is the degree of past experience with the park. However, differences in use displacement can be identified. Urban locals and urban regional visitors are more likely to displace than rural visitors. This behavior may be caused by the existence of more alternative sites, such as urban parks, near their residence.

### Tourists

Close to 20% of the tourists evaluate the park as crowded at specific times or places (Table 3). Tourists, having the opposite past experience exposure relationship as locals, also have the lowest level of bonding with the site and, consequently, report the lowest crowding evaluations. Even within this group, no correlations were found between past experience variables and crowding perceptions. For them, the park plays no role as an everyday living environment or as a day-use area, particularly as for most of them, i.e., German bicyclists, the park is only a small component of their bicycling tour and not their travel destination. Marginal numbers of tourists who perceive crowding apply use displacement in terms of intra-area displacement.

Little local knowledge, time constraints, and the role of the park as a small segment of their itinerary may prevent this group from displacement. Therefore, use displacement seems to be a fairly irrelevant concept for tourists to this peri-urban national park.

### Potential Impacts on Wildlife

Intra-area and temporal displacement because of the crowding perceptions of about 16%, mostly regular, visitors might be of particular concern for environmental park management. The users who displace visit the park at other times and use less-frequented trails. This behavior increases the problems for the management because the greater dispersal of visitor use in time and space increasingly fragments the small conservation area, thereby potentially further reducing the undisturbed wildlife zones. In particular, when both temporal and intra-area displacement are used in combination, and the substitute setting is of high ecological value, impacts on wildlife could be severe. This pressure could lead to the ecological potential of the national park, in respect to the number of species and individual animals, being suboptimally utilized (Wagner and others 2005). The permanent recreation use pressure seems particularly critical from the point of view of wildlife because the park represents the only remaining migratory corridor for ungulates between the Alps and Carpathians (Völck 2001). Therefore, the displacement of regular visitors from crowded areas is also one management issue associated with past experience (Hammit and others 2004).

Use displacement might also be a concern for park management from the social perspective. Visitors who displace shift their activities to previously less-used times and places, reducing the opportunities for specific types of recreation experiences (Manning and Valliere 2001). Increasing use levels will further diminish such recreation opportunities and narrow the range of potential substitutes within the park.

### Conclusion

The challenges facing the administration of the peri-urban Danube Floodplains National Park differ remarkably from those in remote areas. Management is not only confronted with high-use levels, but also with high proportions of local residents and regional visitors, who perceive the park as crowded and displace, potentially reducing undisturbed wildlife zones. A sophisticated management approach is necessary to manage such parks without degrading the outdoor

recreation experience of all user groups, while absorbing a limited number of park-based tourists, without affecting the natural ecosystem.

The concerns of traditional area users with a high degree of past experience seem to be the most relevant for park managers (Hammit and others 2004). Management measures such as the limitation of visitor numbers or closing trails close to settlements or favorite places would not be an option because the national park serves as a highly needed recreation area for local residents and regional visitors. At the same time, the high share of repeat users with excellent local knowledge makes measures to manage recreation use within the area more difficult to enforce, because these visitors can more easily avoid congested trails and areas. Locals would also strongly disapprove of any limitations on the use of their everyday environment or day-use area. These challenges will be further complicated, because the potential number of visitors may increase as a result of the current traffic and settlement developments in the vicinity of the park and, potentially, result in more dissatisfied users who displace and increasingly impact wildlife.

Based on the study results, the question for the management of this peri-urban national park arises as to whether it should be purposely marketed to attract additional park-based tourists, although it is already heavily used by local residents and regional day visitors, and crowding perceptions and use displacement occur. This question sounds somewhat paradoxical, especially because the park-based tourist is usually one of the target visitors for a national park. Complicating the situation further for park management, some national parks in remote settings have been established as an engine for regional development, attracting nature-based tourism (Ceballos-Lascurain 1996; Sickle and Eagles 1998). Such an economic impact, resulting from attracting overnight tourists, was also expected by some local rural stakeholders in the national park region (Närr 1995). They had, therefore, supported the establishment of the national park. However, only a low number of visitors has been attracted because of the national park itself, and only a few overnight tourists stay in the hotels or bed-and-breakfast pensions in the national park region just outside Vienna (6% of all respondents), allowing only a limited number of local residents to benefit from tourism. Opportunities to offset the perceived costs arising from tourism through increased commercial benefits seem to be reduced, and local stakeholders have recently expressed some dissatisfaction with the current economic situation. Therefore, a national park on the periphery of a metropolis appears to be ill-suited as a regional

development tool, and this should be communicated to the local rural population so as not to give rise to too high expectations for additional income possibilities from overnight tourists.

Area administration should apply visitor management measures not only within the park boundaries but also should consider developments in the surroundings to influence factors causing use pressure. However, the park administration will not be able to solve these problems and tendencies by itself. Some cooperation with the City of Vienna and the Government of Lower Austria and the surrounding communities will be essential in order to establish sustainable management measures and regulations in the areas of urban development and traffic planning. Providing green spaces around the national park as buffer zones, as well as more attractive recreation opportunities in the city and adjacent region, would deflect some use pressure from the core zones of the small national park and the traditional recreation areas of local residents.

The high level of displacement behavior of regional and, particularly, local visitors who perceive crowding, shown in this study, indicates the importance of involving these groups in park management and participatory processes. Areas and time periods for park-based tourism, such as guided tours, which do not conflict with times and places intensively used by local and traditional user groups, have to be found by park management. Setting up a sophisticated signage system could prevent nonlocals and less area-experienced visitors from visiting areas traditionally used by locals. Establishing an advisory board and focus groups dealing with current developments in the vicinity of the communities and the city, and integrating local residents' opinions into planning and marketing processes, would increase the trust in the park and community administration. Permanent monitoring of the social and ecological impacts would be steps towards sustainable area management.

Future research should explore, in detail, why visitors who feel crowded do—or do not—displace, whether cognitive coping mechanisms such as rationalization and product shift are applied (Manning and Valliere 2001; Schneider and Hammitt 1995), and whether area satisfaction is influenced by crowding. Future research should also investigate whether additional factors influencing crowding and use displacement, such as the degree of place attachment (Kyle and others 2005) and user conflicts, exist. Here, it would be of particular interest to analyze whether place attachment and inter-area use displacement are related. Additional research is needed to obtain a fuller

understanding of the relationship between place attachment, use displacement, and the concept of substitutability.

Seeing that some items used are different from those in past studies, more variables, such as the years of use and the years of living close to the park, should be employed in future research to measure past experience. This on-site survey did not contact former visitors who had displaced completely, and the relatively low response rate raises the issue of a potential for a non-response bias. For future research, off-site investigations using mail-back surveys or semistructured interviews in the residential areas should be used to identify the number of users who displaced completely and the constraints preventing a park visit, and to intercept visitors using the bicycle for traveling within the park. More investigations on actual displacement, use displacement in terms of time, off-trail use, and the amount and effects of recreation use and use displacement on wildlife should be carried out, using long-term wildlife and visitor monitoring techniques such as sensors Global Positioning System (GPS) for ungulates and visitor counting devices in parallel.

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