



Perceptions of recreational trail impacts on an urban forest walk: A controlled field experiment



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ABSTRACT

Urban forest managers regularly deal with recreational trail impacts and dissatisfied trail users. This exploratory study examined the extent to which various objectively measured recreational impacts on urban forest trails are perceived by trail users, and how perceptions affect the quality of their experience. The influence of age and education was also examined.

An integrated approach combining biophysical and social science aspects was used with a convenience sample of university students and retirees ($N=82$). A 1700 m long study trail through a natural forest within an urban landscape park was pre-assessed before the walk for visual impacts such as erosion, litter, exposed roots, vandalism, muddy trail sections, divergent and parallel trails, excessive trail width, domestic animal waste and sporting activity impacts. After the participants had walked the trail individually, they completed a questionnaire which asked which trail impacts they had noticed, to what extent they had noticed them, and whether and to what degree that had influenced their recreation experience.

The results indicated that some impacts such as muddy trail sections and informal trails were perceived to a much greater extent than assessors had objectively measured them.

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Introduction

Urban recreational areas such as urban forests are under heavy use pressure (Arnberger, 2006; Smrekar et al., 2011). Urban forests, being a part of urban green spaces, are exposed to various recreational use impacts such as trail degradation, soil removal and littering (Manning, 2011). Trails are the most important recreational infrastructure in urban forests. Trail corridors provide a context that affords access where visitors seek restorative

experiences (Kaplan and Kaplan, 1989; Hartig et al., 1991) but also encounter recreational impacts (Moore et al., 2012). Therefore, well-managed trail networks include for example, appropriate routing and threading, sufficient maintenance and monitoring of visitors, which help sustain urban forest ecosystems and the quality of recreational experiences (Lynn and Brown, 2003; Monz et al., 2010; Moore et al., 2012). How trail users perceive actual recreational impacts and how those impacts affect their visiting experience is hypothesized as a key information management needs.

Previous research on the perception of recreational trail impacts has found that visitors notice those impacts in general (Chin et al., 2000; Lynn and Brown, 2003; Arnberger and Eder, 2011; Moore et al., 2012) and that their perceptions and preferences for various urban forest management strategies can be influenced by age, education, frequency of visits to the forest and where they live (Tyrväinen et al., 2003). However, few studies have investigated to what extent visitors perceive such impacts compared to their actual occurrence and to what extent specific impacts influence the perceived quality of the experience. Furthermore, little is known about the extent to which the perception of visitors depends on factors such as age or education.

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Urban forest managers often rely on the opinion of visitors as a basis for their daily management activities. However, previous research has found that there could be a gap between objectively measured conditions and visitor perceptions (Merikle et al., 2001; Arnberger and Haider, 2007; Moore et al., 2012). Therefore, forest managers may check whether visitor perceptions of recreational use impacts are reflected in reality or are the result of social norms and values that shape them (Vaske et al., 1986; Donnelly et al., 2000; Heywood and Murdock, 2002) before they implement management measures.

We conducted a controlled field experiment to examine to what extent trail users notice recreational impacts along an urban forest trail and whether these perceptions and walking experiences differ according to age and education level.

Perception of recreational impacts and visit experience

Several studies have investigated relationships between the perceptions of recreational use impacts and its effect on the perceived quality of recreational experiences. Lynn and Brown (2003), for example, investigated the relationship between recreational use impacts (e.g. erosion, litter, muddiness) and their effects on the perception of solitude, remoteness, naturalness and artificialism of hikers in a natural area near Toronto, Canada. They found that recreational use impacts had a negative effect on hiking experiences in a natural area. In a study of littering in urban parks in Columbus, Ohio, littering had a very powerful norm effect, resulting in feelings of guilt, shame and embarrassment (Heywood, 2002). A study by Moore et al. (2012) on a natural-surface trail segment located at Lake Johnson Park municipal park in Raleigh, North Carolina, applied an integrated approach by using a biophysical assessment of recreational impacts and a questionnaire referring to those impacts in order to understand students' perceptions of those impacts and their influence on the respondents' visit experiences. They reported that the majority of the user impacts had an overall negative effect on the respondents' experience. Deng et al. (2003) asked visitors of the Zhangjiajie National Forest Park in China how trampling impacts on vegetation and soil affected their visit satisfaction. They found that recreational satisfaction was negatively influenced by recreational impacts.

Influence of age and education on preference of recreational areas

As noted above, previous research found that user impacts were noticed by visitors, but generally did not quantify those impacts, nor did it examine whether perceptions differed according to factors such as age, ecological knowledge, or social values and norms.

One exception was a study by Arnberger and Eder (2011). In their study on urban green space visitors in Vienna, Austria, they found, not surprisingly, that litter on a recreational trail was negatively evaluated by on-site visitors and this was regardless of age. However, for the elderly, certain trail conditions, particularly litter, played a much greater role in determining trail preferences compared to a younger age cohort. In this case the authors used recreational trail scenario images rather than on site assessments and consequently did not compare objective assessments with trail user perceptions.

A cohort study from Tokyo by Takano et al. (2002) stressed the importance of appropriate and accessible trails in urban green areas to attract senior citizens with the goal of enhancing health. It is important to note, however, that older citizens have additional trail infrastructure requirements as a result of their diminishing physical abilities and vision (Guirao et al., 1999; Lord, 2006; Bell et al., 2007). In this regard conditions such as exposed roots or muddy trail sections are likely to disproportionately increase the risk of slipping or tripping among senior users. This theme is also explored in a study

conducted with older people living in Britain (Sugiyama and Ward Thompson, 2008). The authors suggested that enhancing the quality of natural features of green spaces, quality of paths and reducing incivilities could encourage older people to increase recreational walking. In another image-based study of the Helsinki City forest by Tyrväinen et al. (2003), they found that men, younger respondents and highly educated individuals preferred more natural looking forest with dead and decayed trees while the majority of participants preferred more managed forests. This same study also indicated that highly educated individuals preferred ecological management options with abundant undergrowth and decaying wood. A recent explorative study by Qiu et al. (2013) examined whether the ecological knowledge of students unrelated to the subject of ecology and former students considered ecological experts had an influence on preference for various biodiversity indicators by providing them cameras to capture their preferences. They found that dead wood and old trees were more prevalent examples of the species richness photo images taken by ecological experts, while the lay participants had more representations of visual diversity of vegetation. Another study investigating urban trail preferences using a 3D computer-animated choice experiment found that litter and trail damage were disliked by landscape planning students (Reichhart and Arnberger, 2010). Their study, however, focussed on preferences and not on actual perceptions, and did not study on-site visitors. While previous research has found that age and ecological knowledge can shape trail user preferences, the question of whether these factors influence the perception of quality of on-site trail users remains unanswered. This gap in the literature is addressed in this study.

Research questions

The following research questions guided this study:

1. To what extent do trail users perceive recreational impacts compared to their objectively measured occurrence along the study trail.
2. When comparing the users of different age and ecological knowledge level, are there differences in perception of various types of recreational impacts among them.
3. To what extent is the trail walking experience correlated to users' perception of recreational use impacts, participant age and ecological knowledge.

Methods

Study area

More than 60% of urban forests within the City of Ljubljana are primal natural forests and have continuously offered a close-to-nature forest ecosystem experience to citizens (Hladnik and Pirnat, 2011). Most of the forest area has been protected since 2010 (Odlok, 2010) to conserve its social and ecological forest functions.

This study took place in a highly visited, protected remnant of natural mixed forest within the Tivoli, Rožnik and Šišenski Hill Landscape Park in the centre of Ljubljana (N 46.05, E 14.48; Figs. 1 and 2). In 1984 the 459 ha area was declared a natural landmark (Odlok, 1984). A study conducted in 2010 (Smrekar et al., 2011) estimated 1,750,000 visits to this forest per year. Due to greater promotion of outdoor recreation the number of visits and the diversity of recreation in this forest are expected to increase. As a consequence, a greater recreational use is likely to increase recreational impacts (Marion and Leung, 2001; Monz et al., 2010).

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