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Landscape effects on soundscape experience in city parks

Jiang Liu [a,b,c], Jian Kang [c,d], Tao Luo [a,*], Holger Behm [b]

[a] Key Lab of Urban Environment and Health, Institute of Urban Environment, Chinese Academy of Sciences, Xiamen, China
[b] Landscape planning and landscape design, Faculty of Agricultural and Environmental Sciences, University of Rostock, Rostock, Germany
[c] School of Architecture, University of Sheffield, Sheffield, United Kingdom
[d] School of Architecture, Harbin Institute of Technology, Harbin, China

HIGHLIGHTS

- Landscape effects on soundscape perception in city parks are examined.
- Visual landscape has more effects on perceived occurrences of natural sounds.
- Functional landscape has more effects on preferences for artificial sounds.
- Landscape factors significantly affect the overall soundscape preference.

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ABSTRACT

The main objective of this study was to analyse the effects of various landscape factors on soundscape perception in city parks. This was based on the experience, which was supposed to reflect soundscape perception, of 580 users of five city parks in Xiamen, China. Visual and functional landscape characteristics were analysed in relation to experienced occurrence of and preference for individual sounds, as well as overall soundscape preference. The results suggest that landscape factors have more significant effects on experienced occurrence of individual sounds than preference for individual sounds. However, landscape effects on overall soundscape preference depend more on preferences for individual sounds. The effects of visual landscape on the perception of individual sounds could be more important in natural sounds than in artificial sounds, and more in experienced occurrence of than preference for individual sounds; for functional landscape the effects are reversed. In general, visual landscape effects on the perception of individual sounds are more significant than functional landscape effects, especially on experienced occurrence of individual sounds. Taking all factors into account, only the two landscape factors are highly correlated with the overall soundscape preference, with coefficient values of 0.325 and 0.204, respectively. Overall, the results reveal the close relationship between landscape and soundscape experience in real contexts, and that visual and functional aspects should be considered in terms of creating a better soundscape during park design and management processes. The analysis of users' social, demographical and behavioural factors such as age, visit frequency and length of stay, in relation to the soundscape experience, has also shown significant effects.

1. Introduction

Soundscape as a concept was coined from the very beginning in close relationship with landscape (Schafer, 1969). Landscape factors have been considered in many previous studies in relation to sound and soundscape perception (Southworth, 1969; Carles et al., 1992; Watts et al., 1999; Viollon et al., 2002; Pheasant et al., 2008). Visual aspects of landscape in particular are thought to be closely related with soundscape perception in terms of experience of the surrounding spaces (Southworth, 1969; Carles et al., 1999; Kang, 2007; Pheasant et al., 2008; Joynt and Kang, 2010).

Soundscape is usually interpreted by means of identifying and describing different sound sources in a certain place (Brown et al., 2011). In the process of soundscape perception, how sensitive people are to specific sounds in the place and their preferences for these sounds are expected to affect their overall opinions of soundscape quality. This process could be affected by many factors as studied previously (Zhang and Kang, 2007; Kang et al., 2012). Specifically, in urban open spaces the effects of social, demographical and behavioural factors on soundscape perception have been widely analysed in terms of preference for sounds, subjective sound level evaluation and acoustic comfort evaluation (Yang and Kang, 2005a,b; Yu and Kang, 2008; Szeremeta and Zannin, 2009). However, it seems that these factors are not universally effective in

* Corresponding author at: 1799 Jimei Road, Xiamen 361021, China. Tel./fax: +86 592 6190673.
E-mail addresses: jiang.liu@uni-rostock.de (J. Liu), j.kang@sheffield.ac.uk (J. Kang), tluo@iue.ac.cn (T. Luo), holger.behm@uni-rostock.de (H. Behm).

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explaining differences in soundscape perception (Rylander et al., 1972; Fields, 1993; Miedema and Vos, 1999; Yang and Kang, 2005a; Yu and Kang, 2008). The reason may be that people in different types of urban open spaces may have different expectations and sensitivities of soundscapes, and use correspondingly different evaluation criteria. Thus soundscape perception under the effects of various factors should be examined more specifically, namely, in a given type of urban open spaces with similar cultural backgrounds. City parks, for example, with designed landscape and necessary functions are important recreation places for citizens. The visiting experience of the park users could also be affected by soundscape quality. However, soundscape qualities in city parks have not been comprehensively studied, neither the effects of landscape factors, which to some extent are intrinsic to soundscape quality (Schafer, 1969).

Therefore, based on information gathered in a field survey in five city parks with general public, contribution of different factors to the general use experience as well as relationships between two aspects of landscape factors, i.e., visual and functional, which in this study specifically refer to scenic beauty and the status of infrastructures and facilities in the parks, and soundscape perception based on the users' experience were analysed. The aim of this study is to reveal the effect of landscape factors on soundscape experience in terms of experienced occurrence of and preference for individual sounds, as well as overall soundscape preference in city parks. The effects of social, demographical and behavioural factors are also considered.

2. Methodology

2.1. Field survey

The survey was carried out in five public city parks during summer time in 2012 in Xiamen, China: Bailuzhou (west), Huli, Haiwan, Nanhu and Zhongshan. All these parks are located in the Xiamen island (the central area of Xiamen city), of similar size, and considered as important according to the Park list of Xiamen (Xiamen Construction and Administration Bureau, 2009), popular, and freely accessible. Fig. 1 shows reference images from Google Earth and general introductions for each park. Through pilot investigations before the main survey 17 different sounds regularly appearing in the parks were identified, including natural sounds (biological and geophysical sounds) and artificial sounds (human sounds, human made sounds and mechanical sounds). These

	Name: Bailuzhou (west) Location: 24° 28' 32.94" N, 118° 05' 06.30"E Scale: E-W: 530m, S-N: 250m Features: Built in 1997, first large open city park in Xiamen, with sinking stage and music fountain square, popular for large public cultural activities.
	Name: Haiwan Location: 24° 28' 33.15" N, 118° 04'18.30"E Scale: E-W: 320m, S-N: 570m Features: Opened in 2006, city comprehensive park with tourism, leisure and entertainment functions.
	Name: Huli Location: 24° 30' 23.36" N, 118° 06' 04.48"E Scale: E-W: 400m, S-N: 500m Features: Opened in 1996, city comprehensive park, combining entertainment with garden, modern attractions with natural landscape.
	Name: Nanhu Location: 24° 28' 53.09" N, 118° 06' 05.24"E Scale: E-W: 450m, S-N: 550m Features: Opened in 1995, near the Yuandang lake, one of the most famous scenic areas in Xiamen "YuandangYuhuo".
	Name: Zhongshan Location: 24° 27' 40.63" N, 118° 05' 06.40"E Scale: E-W: 250m, S-N: 550m Features: Built in 1927, garden-style park with notable characteristics of main gates, bridges, pavilions and still water features.

Fig. 1. The five studied city parks from Google Earth, shown with the areas with broken line, and general information of the parks.