Landscape and Urban Planning 161 (2017) 32–43

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Capturing residents' values for urban green space: Mapping, analysis and guidance for practice

Christopher D. Ives[a,b,*], Cathy Oke[a,c], Ailish Hehir[d], Ascelin Gordon[a], Yan Wang[d], Sarah A. Bekessy[a]

[a] School of Global, Urban and Social Studies, RMIT University, Melbourne, Australia
[b] School of Geography, University of Nottingham, Nottingham, United Kingdom
[c] Clean Air and Urban Landscapes Hub, National Environmental Science Programme, School of Earth Sciences, University of Melbourne, Melbourne, Australia
[d] School of Science, RMIT University, Melbourne, Australia

HIGHLIGHTS

- Public participation GIS used to elicit residents' values for green open space.
- Respondents assign a range of values to green open spaces simultaneously.
- Values assigned to parks were related statistically to landscape characteristics.
- Distance from water is important but park management classification less so.
- Theoretical, statistical and practical challenges exist when applying PPGIS.

ARTICLE INFO

Article history:
Received 29 March 2016
Received in revised form
12 December 2016
Accepted 17 December 2016

Keywords:
Urban parks
Green space
Landscape values
Urban planning
PPGIS
Biodiversity

ABSTRACT

Planning for green space is guided by standards and guidelines but there is currently little understanding of the variety of values people assign to green spaces or their determinants. Land use planners need to know what values are associated with different landscape characteristics and how value elicitation techniques can inform decisions. We designed a Public Participation GIS (PPGIS) study and surveyed residents of four urbanising suburbs in the Lower Hunter region of NSW, Australia. Participants assigned dots on maps to indicate places they associated with a typology of values (specific attributes or functions considered important) and negative qualities related to green spaces. The marker points were digitised and aggregated according to discrete park polygons for statistical analysis. People assigned a variety of values to green spaces (such as aesthetic value or social interaction value), which were related to landscape characteristics. Some variables (e.g. distance to water) were statistically associated with multiple open space values. Distance from place of residence however did not strongly influence value assignment after landscape configuration was accounted for. Value compatibility analysis revealed that some values co-occurred in park polygons more than others (e.g. nature value and health/therapeutic value). Results highlight the potential for PPGIS techniques to inform green space planning through the spatial representation of complex human-nature relationships. However, a number of potential pitfalls and challenges should be addressed. These include the non-random spatial arrangement of landscape features that can skew interpretation of results and the need to communicate clearly about theory that explains observed patterns.

1. Introduction

Green spaces in urban environments are vital green infrastructure for a raft of environmental, social and economic benefits (Hunter & Luck, 2015; Jorgensen & Gobster, 2010; Swanwick, Dunnett, & Woolley, 2003). In the past few years, scholars have sought to understand the specific characteristics of green spaces

* Corresponding author at: School of Geography, University of Nottingham, University Park, Nottingham NG7 2RD, United Kingdom.
E-mail addresses: chris.ives@nottingham.ac.uk (C.D. Ives), cathy.oke@unimelb.edu.au (C. Oke), ail.heh@gmail.com (A. Hehir), ascelin.gordon@rmit.edu.au (A. Gordon), yan.wang@rmit.edu.au (Y. Wang), sarah.bekessy@rmit.edu.au (S.A. Bekessy).

http://dx.doi.org/10.1016/j.landurbplan.2016.12.010
0169-2046/

that promote visitation (Grahn, Stigsdotter, & Berggren-Bärring, 2005), health benefits (McCormack, Rock, Toohey, & Hignell, 2010) and mental restoration (Nordh, Hartig, Hagerhall, & Fry, 2009). Recent reviews of the literature have shown that green spaces are indeed important for human health and well-being and environmental sustainability, although the specific mechanisms or pathways for these benefits are often complex (Kabisch, Qureshi, & Haase, 2015; Konijnendijk, Annerstedt, Nielsen, & Maruthaveeran, 2013). Social benefits of green spaces in particular have been shown to be influenced by a complex set of factors such as access, maintenance, amenities and perceptions of aesthetic attractiveness and safety (Konijnendijk et al., 2013; McCormack et al., 2010).

In contrast to the study of the health and environmental benefits of green space, social values and attitudes towards green spaces and the cultural services they offer have received less attention (Hitchings, 2013). In their review of empirical research on urban ecosystem services, Luederitz et al. (2015) found that cultural services were the least represented group. The values people assign to landscapes can be understood as an expression of these cultural services (Plieninger, Dijks, Oteros-Rozas, & Bieling, 2013). On a theoretical level, these values exist in the "relational realm", where value "emerges from the interaction between a subject and an object" (Brown, 1984). Assessing the values people assign to natural areas is a critical component in sustainable landscape management (Kenter et al., 2015; Plieninger et al., 2015), yet the importance of places to urban residents will not necessarily be evident from their use patterns alone (Ives & Kendal, 2014; Swanwick, 2009). Indeed, Tyrväinen, Mäkinen, and Schipperijn (2007) in their study of green space values in Helsinki found open spaces that were identified by local residents to be their favourite were not the most frequently used green spaces.

Applying assessments of green space values and benefits to planning and management has been identified as an area in need of further research (Luederitz et al., 2015; Tratalos, Haines-Young, Potschin, Fish, & Church, 2015). Historically, a variety of approaches has been used to plan and manage green space networks (Maruani & Amit-Cohen, 2007), yet there is a need for greater knowledge of how specific landscape variables influence green space values and how these insights can be applied to planning practice. A challenge of urban landscape planning is reconciling knowledge on how landscapes function (i.e. what *is*) with normative assertions about desired future states and actions towards them (i.e. what *ought to be*) (Campbell, 2012). Lindholst et al. (2015) identify three scales at which reconciliation between research and planning practice can take place: (i) the conceptual level, where scholarly ideas influence planning frameworks and paradigms, (ii) the policy level, where knowledge can inform planning policies, and (iii) the applied level, where insights on human interactions with ecosystems can provide guidelines and practical advice on planning and management actions. When relating evidence on landscape values to practice, it is therefore important to consider the level at which this integration should occur.

If intangible values for green spaces are to be understood and integrated into planning practice, there is a need for methods to capture these values in ways that can be readily applied. Public Participation Geographic Information System (PPGIS) methods are growing in popularity in applied landscape research because of their ability to engage stakeholders and capture spatially-explicit information on intangible landscape values that can be integrated with existing planning approaches (Brown, 2012; Van Herzele & van Woerkum, 2011). PPGIS is a field of geographic information science that focuses on the use of geospatial technologies by the public (such as mapping) to participate in public processes (Tulloch, 2008). Mapping activities have been commonplace in community planning for some time, such as the use of maps as stimuli for group dialogue or allowing community members to draw significant landscape features on maps themselves in a deliberative setting (Wates, 2014). While these methods promote deep engagement with the planning process and elicit nuanced local knowledge of an area, the PPGIS method explored in this study is oriented towards greater quantification of this knowledge and broader community representation. Such GIS-based approaches are able to spatially represent community landscape perceptions within a form of data commonly used in decision-making. Kabisch et al. (2015) therefore called for greater use of these techniques in urban environment research because of their ability to connect research with practice.

However, while the number of scientific studies using PPGIS has increased over time, there remains some resistance to the use of participatory approaches by planning professionals because expert opinion is seen as superior or more reliable than 'crowd-sourced' information (Brown, 2015). Future empirical research that uses PPGIS techniques should therefore consider not only scientific or theoretical issues, but also how PPGIS can be applied in landscape practice.

A number of studies have applied PPGIS techniques to urban systems in recent years with some key insights beginning to emerge. First, residents often assign a diversity of values to green spaces (Brown, 2008; Tyrväinen et al., 2007), lending empirical support to the notion of landscape value plurality (see Zube, 1987) within urban landscapes. Yet not all mapped values for green space are of equal significance. For example, Kyttä, Broberg, Tzoulas and Snabb (2013) found the most positive values were associated with attractiveness, ease of walking/cycling and presence of nature, while Tyrväinen et al. (2007) found 'opportunities for activity' and 'beautiful landscape' to be the most frequently assigned social values in green spaces. Second, geographic factors influence the strength and diversity of mapped values. This led Brown (2008) to develop a 'theory of urban park geography' using data from a public survey where residents of Anchorage, Alaska identified places on a map of their local area that they valued. Brown (2008) found strong support for the theory that the diversity of park values is positively related to green space size (area), and weak support for a negative relationship between value diversity and the distance of a green space from concentrated human habitation. Similar results were found by Brown, Schebella and Weber (2014) who found that larger green spaces contained more mapped benefits and activities from an online survey in Adelaide, Australia. The influence of geographic proximity as a variable lends support to the theory of spatial discounting of place values (Norton & Hannon, 1997). Finally, other PPGIS studies have shown that specific biophysical and management characteristics of green spaces influence assignment of values. For example, green space classification has been related to the values assigned to the spaces and the activities undertaken within them (Brown et al., 2014; Brown, 2008), and green spaces located in close proximity to a shoreline being found to also be assigned more positive values (Balram & Dragićević, 2005; Kyttä et al., 2013). Given PPGIS remains a relatively new technique for assessing relationships between people and green spaces, there is a need for further empirical research on these issues.

There are some key outstanding research gaps in the application of PPGIS information on urban green spaces to urban planning. Relevant questions include (i) how applicable are the findings from existing PPGIS studies on social values for green space to other regions? (ii) how can statistical techniques be refined to better accommodate the type of data collected in PPGIS studies and what might these tell us about relationships between mapped values and biophysical green space characteristics? and (iii) what challenges might need to be overcome in order to better apply spatially-mapped social values for green spaces to landscape planning practice? This article addresses these gaps by pursuing the following objectives: (1) assess the spatial representation of positive and negative social values for green space in an urbanising region, (2)