Applied Geography 63 (2015) 77–88

Contents lists available at ScienceDirect

Applied Geography

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

The role of distance in peri-urban national park use: Who visits them and how far do they travel?

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ARTICLE INFO

Article history:
Received 20 November 2014
Received in revised form
16 June 2015
Accepted 17 June 2015
Available online xxx

Keywords:
Urban-rural fringe
Park use
Visitor
Distance decay
Travel patterns
Gravity model

ABSTRACT

There is a sizable literature about the factors shaping park visitation and use – especially for urban parks, including (i) geographic (e.g. proximity), (ii) socio-cultural (e.g. population characteristics) and to a lesser extent, (iii) individual psychometric factors (e.g. attitudes and values). Yet comparatively little is known about how factors related to distance may affect peri-urban national park use, particularly outside the United States. This paper reports on research investigating distance-related factors affecting use of a peri-urban national park in Brisbane, Australia. This study found that older visitors live closer to the park while younger visitors travel further to use it. Surprisingly, travel distance did not vary with the type of recreational activities that users were conducting in the park. These results have implications for park planning and management including user demand for different recreational activities in peri-urban national parks. Results are useful for scholars using distance decay models to explain travel behaviour, evidencing the empirical veracity of the model in different places and across different service types. The findings are especially important for geographers because they demonstrate that assumptions about uniform park catchments may be unsupported and need to be empirically validated.

1. Introduction

More than two decades ago, Eldridge and Jones (1991) asserted that: 'few concepts are more central to the discipline of geography than distance decay'. The basis of this assertion was that distance affects many spatial patterns, processes and relationships, and even underpins Tobler's (1970) observations about the relatedness of things in space – often referred to as the 'first law of geography'. Geographers have given attention to the explicit role of distance decay across a variety of human–environment interactions, such as travel-demand behaviour for facilities including food distribution centres (LeDoux & Vojnovic, 2014), casinos (Markham, Doran, & Young, 2014), and health care (McGrail & Humphreys, 2009). Distance decay effects have also been observed in demand for recreation and tourism facilities (e.g. Burton & Veal, 1971; Elson, 1979; Hooper, 2014; Lee & Schuett, 2014; Veal, 1987). And such effects have long been examined across diverse fields including business, marketing, leisure, and transport research (e.g. Brown, 1992; Cardozo, García-Palomares, & Gutiérrez, 2012; Huff, 1964; Reilly, 1931; Spinney & Millward, 2013; Vickerman, 1974). Although the relationship between urban park use and the distance that people travel to visit urban parks has generated substantial scholarly attention (Giles-Corti et al., 2005; Kaczynski, Potwarka, & Saelens, 2008a; McCormack, Giles-Corti, Bulsara, & Pikora, 2006b; Talen, 1997, 1998; Talen & Anselin, 1998), distance decay studies of facilities such as wildland recreation sites and protected areas are less common in geography specifically and other disciplines generally (Bateman & Langford, 1997; Hanink & White, 1999; Zhang, Wall, Du, Gan, & Nie, 1999). Therefore, studies of distance-decay for peri-urban parks warrant closer investigation.

Common sense suggests that people who live nearer to a park will visit it more often than those who live further away (Stanis, Schneider, & Anderson, 2009). This idea is known as the 'proximity' hypothesis (Van Dijk & Van der Wulp, 2010), and has received some attention in the leisure studies and geography literature, but not as much as might be expected (Byrne & Wolch, 2009). Similarly, the observation that overall park use declines with increasing distance from a park has also attracted attention (Dee & Liebman, 1970). This is typically held to be a function of a 'distance decay' (Gregory, Johnston, Pratt, Watts, & Whatmore, 2009; Wu & Cai, 2006).

Some scholars suggest that distance is also an important

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http://dx.doi.org/10.1016/j.apgeog.2015.06.008
0143-6228/

component of a broader construct known as park 'accessibility', because distance from a park appears to be strongly correlated with other aspects of park use, such as the frequency of visitation, or the types of activities people undertake when they visit a park (Giles-Corti et al., 2005). Distance also plays a selective role, interacting with the socio-demographic characteristics of potential park visitors, differentiating those who can readily access parks and those who cannot (e.g. (dis)ability, sex, age, race, ethnicity) (Byrne & Wolch, 2009; Nicholls, 2001; Talen, 2010; Wolch, Byrne, & Newell, 2014); see also (McKercher, 2008; McKercher, Chan, & Lam, 2008; Spinney & Millward, 2013).

For instance, researchers have found that people who live closer to a park tend to visit more often, but visit for shorter periods of time compared to those who live further away (Hanink & White, 1999). They also seem to undertake different types of activities when in the park, such as daily exercise routines, dog-walking and spending time alone, which may only be partly related to park design (Golicnik & Ward Thompson, 2010; McCormack, Giles-Corti, Bulsara, & Pikora, 2006a, 2010). Conversely people who travel further to visit a park, especially larger regional and national parks, tend to stay longer, and undertake activities based on active recreation or socialising (Arnberger & Brandenburg, 2007). This has led some scholars to conclude that there are different 'travel thresholds' for different types of recreational activity (Spinney & Millward, 2013).

In this paper we examine the comparatively poorly understood issue of distance-based variations in peri-urban national park use. This is important because rapid urbanisation is reducing the amount of greenspace in many cities around the world, potentially leading to problems with physical and mental health, citizen wellbeing, and residents' understanding of the natural world (Roy, Byrne, & Pickering, 2012). As the amount of urban greenspace (e.g. parks) declines, and urban areas expand, these trends may increase pressure on peri-urban greenspaces, such as regional and national parks and other protected areas for recreational use (Arnberger & Brandenburg, 2007). The term 'peri-urban national parks', in the context of this paper, refers to those parks located in the urban-rural fringe of a city, which is defined as the area between the outer edge of continuous built-up residential areas of a city or town and the rural-production space, irrespective of density of people per unit area (Lawton & Weaver, 2008; Nelson, 1992; Taylor, 2011).[1] Our understanding of how distance affects travel to peri-urban greenspaces is limited.

There are broader public health and social and environmental justice implications associated with distance-based patterns of peri-urban park use. These include ethno-racial and socio-economic differentiation in who can access these important nature spaces, and potential health consequences that stem from limited access (Byrne & Wolch, 2009; Dai, 2011; Wolch et al., 2014). Here, 'access' refers to "the ease with which a site or service may be reached or obtained" and has been found to be related to, among other things, objectively measured and perceived distance (Nicholls, 2001). By better understanding how travel patterns and distance affect park utilization, geographers can begin to devise strategies to assist park managers and urban planners in taking steps to redress social and environmental inequalities arising from differentiated park access and potentially to help improve transport options for more distant parks and greenspaces.

This paper examines the distance decay relationship between visitors' characteristics including socio-demographic and visitation patterns, the distance travelled to a park, and visitors' place of residence, for a large peri-urban national park in Australia. Specifically it addresses five inter-related questions: (1) who visits this park? (2) how far do they travel to the park? (3) how is visitation affected by distance? (4) does the distance travelled to the park vary with visitors' characteristics? and (5) does the spatial distribution of park visitors' place of residence vary with visitors' characteristics? The paper is divided into five sections. First we examine the concept of 'distance decay' and how it has been understood by geographers, before focussing on distance decay effects in park use. We then discuss the methods we used in this study, before analysing our results. Following this, we consider the policy implications of our findings, and provide recommendations for further research. Importantly, we have found an age-effect in peri-urban park visitation where older visitors live nearby, and younger visitors travel further to visit the park. We discuss the implications of this result in the discussion and conclusion sections of this paper.

1.1. Distance decay models

Distance decay models in geography originated from the mathematical 'gravity' model, which was used to represent spatial interactions and to denote the attenuation of a spatial relationship with increasing distance (Brown, 1992; Eldridge & Jones, 1991; Huff, 1964; Huff & Jenks, 1968; Reilly, 1931). Also called the 'friction of distance', the idea of distance decay is based on the notion that as distance from a destination increases, the frequency of visitation declines. These concepts are implicit in Tobler's (1970) 'first law of geography', which states that everything is spatially related, but things that are spatially closer are more related than distant things (Gregory et al., 2009).

Scholars have identified four different distance decay curves, which have been used to explain spatial effects related to distance: exponential, classic, plateau and secondary peak curves (Fig. 1). The exponential function of distance decay (Fig. 1), where the strength of the interaction decreases dramatically with increasing distance, is arguably the most common form of this model (Gregory et al., 2009; Skov-Petersen, 2001). Importantly, scholars have observed that distance decay effects are not uniform, and are subject to spatial variation produced by "geographic differences in transport technology or network accessibility" (Eldridge & Jones, 1991, p. 501; see also Fotheringham & Pitts, 1995; Huff & Jenks, 1968). Moreover, distance decay effects are related not only to physical space, but also to socio-demographic factors (income, race, age) and psychometric factors (values, attitudes, perceptions) associated with socio-cultural spaces (Van Acker, Van Wee, & Witlox, 2010). It should be noted that distance decay models are different to travel cost models. The latter estimate the non-market value of a good or services (e.g. a park) based on the distance that users travel to access that good or service (e.g. Benson, Watson, Taylor, Cook, & Hollenhorst, 2013).

A wide variety of studies have investigated spatial effects related to distance decay. They include health care utilization (Arcury et al., 2005; Jia, Xierali, & Wang, 2015), hospital catchment travel times (McGrail & Humphreys, 2014; Schuurman, Fiedler, Grzybowski, & Grund, 2006), tourism (Hooper, 2014), and retail catchments (Brown, 1992; Reilly, 1931; Reynolds, 1953; Young, 1975). One area that has attracted considerable attention is recreation and tourism (Hall & Page, 2002). Studies examining suburban recreation and tourism demand and provision have found distance decay patterns

[1] Several methods are used to distinguish peri-urban spaces from urban and rural areas including population density, urban structure characteristics, landscape patterns and/or night-time satellite images (Allen, 2003; Grosvenor & O'Neill, 2014; Sutton, Cova, & Elvidge, 2006). However, context matters; differences in city and country characteristics can effect the accuracy of a given classification method for distinguishing among urban, peri-urban and rural areas (Allen, 2003; Grosvenor & O'Neill, 2014). For example, the population density for the same unit area can vary greatly if the same number of people are housed in three story apartments or four to nine story apartments (Griffiths, 2009).