

Data Descriptor



Data for an Importance-Performance Analysis (IPA) of a Public Green Infrastructure and Urban Nature Space in Perth, Western Australia

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Abstract: This Data Descriptor shares the dataset generated by a visitor satisfaction survey of users of a mixed-use public green infrastructure (PGI) space in Perth, Western Australia, that incorporates remnant and reintroduced urban nature (UN). Conducted in the Austral summer of 2016–2017, the survey (*n* = 393) utilized the technique of Importance-Performance Analysis (IPA) to elucidate perceptions of PGI users regarding performance of the amenity and facilities at the study site. There is a growing body of research that reports the innate, inbuilt affinity of humans to natural systems and living things. As humankind has grown exponentially over the past 50 years, humanity, as a species, is living an increasingly urbanized lifestyle, resulting in spreading urban footprints and increased population densities that are causing humans to become increasingly disconnected from nature. These conflicting phenomena are driving research to understand the contribution that PGI and UN can make to enhancing the quality of life of urban residents. With diminishing opportunities to acquire or create new PGI spaces within ever-more-densely populated urban centers, understanding, efficiently managing, and continuously improving existing PGI spaces is crucial to access the benefits and services that PGI and UN provide. The IPA technique can provide the data necessary to inform an evidenced-based approach to managing and resourcing PGI and UN spaces.

Dataset: The dataset has been submitted for publication as a supplement to this Data Descriptor

Dataset License: CC-BY

Keywords: biophilic design; green infrastructure; Importance-Performance Analysis; IPA; public amenity; public open space; renaturing cities; urban nature; urban planning; visitor satisfaction

1. Summary

In addition to the rapid growth of humankind over the past 50 years, humanity, as a species, is becoming increasingly urbanized [1–3]. The Biophilic Hypothesis proposed by Wilson [4] states that humans have an innate, inbuilt affinity to natural systems and living things; however, the increase in the urban footprint and population density is causing human populations to become increasingly disconnected from nature [3,5,6]. These phenomena are driving research into the ways that public green infrastructure (PGI) and urban nature (UN) can enhance the quality of life of urban residents (e.g., [3,5,7–13]). With diminishing opportunities to acquire and/or create new PGI spaces within ever-more-densely populated urban centers, understanding, efficiently managing, and continuously

improving existing PGI spaces is crucial to access the benefits and services that PGI and UN provide for humankind [10,12].

This Data Descriptor shares the dataset for an Importance-Performance Analysis (IPA) survey conducted at a PGI space in Perth, Western Australia. While underutilized in the management of PGI spaces [11,13], IPA techniques provide a relatively simple and straightforward method for quantitatively assessing the performance of PGI and UN spaces. The analysis and insights arising from this dataset are reported in the Research Article by Parker and Simpson [12] published in the *Landscape Urbanism and Green Infrastructure* special issue of the MDPI journal *Land*.

Informed by the review article of Parker and Simpson [11,13] and the IPA research of Newsome et al. [14], Soldić Frleta [15], and Taplin [16], a pen-and-paper-based self-report questionnaire was developed in order to survey visitors to the Lake Claremont PGI space. The questionnaire was designed to gather data regarding the demographic profile of PGI users, and their perceptions regarding the performance of 19 attributes of quality PGI spaces identified from the literature and 3 site-specific attributes (see Section 2). A convenience intercept survey was carried out at the Lake Claremont PGI space in the 2016–2017 Austral summer, coinciding with the peak summer holiday and recreation period [3,17,18].

The demographic and IPA data collected during that survey are shared via the comma separated variable (.csv) file attached to this Data Descriptor as Supplementary Materials. Publication of this data has the potential to benefit others who are researching, planning, and managing urban PGI and UN with the goals of contributing to better PGI, enhancing the protection and renaturing of UN, and creating healthier and more liveable urban environments.

As reported above, the research associated with the dataset shared in this Data Descriptor has produced a systematic quantitative literature review article [11], the associated Data Descriptor [13], and contributed to the publication of an IPA-focused research article [12].

2. Data Description

The data extracted from the 393 questionnaires completed by PGI users were captured in Microsoft Excel and are provided as a .csv file with this Data Descriptor. The de-identified demographic data recorded for each participant is described in Tables 1–3.

Question 1: How Do You Describe Yourself?						
Identifier	dentifier Descriptor Data Type Data Values					
D1	Gender	Categorical	1 = Female 2 = Male 3 = Other 4 = Prefer not to disclose 5 = No Response			

Table 1. The metadata specification for gender data.

Table 2. The metadata specification for age data.

Question 2: Which Age Group Do You Belong to?					
Identifier	Descriptor	Descriptor Data Type Data Value			
D2	Age	Categorical	1 = 18 to 24 Years of Age 2 = 25 to 34 Years of Age 3 = 35 to 44 Years of Age 4 = 45 to 54 Years of Age 5 = 55 to 64 Years of Age 6 = 65+ Years of Age 7 = No Response		

Question 3: Where do you live? Please Tick the Box Most Relevant to You and STATE the Suburb/Town/City/Country of Residence							
Identifier	Descriptor	Data Values					
D3	Place of Residence	Categorical	1 = Surrounding Suburbs (<5 km) 2 = Other Metropolitan Suburbs 3 = Regional Western Australia 4 = Other Australian States 5 = International 6 = No Response				
D4	Place of Residence	Text	Open Question NR = No Response				

Table 3. The metadata specification for usual place of residence data.

Data relating to the perceptions of visitors to the Lake Claremont PGI space regarding the importance and performance of 22 attributes of quality PGI were gathered using the question shown in Figure 1.

How important are the following features of Lake Claremont to you and how satisfied are you with their management?

Item			olum porta	n A Ince			Col atis			1	
 For each feature listed below, please indicate: The Importance of the feature by circling the most relevant the number in Column A. Your Satisfaction with that feature by circling the appropriate number in Column B. If you have not experienced a listed feature during today's visit, then please place an X under 'Unable to Report' at far right of Column B (Satisfaction). 	Not at all important	Not very important	Somewhat important	Very important	Extremely important	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Extremely satisfied	Unable to report
Availability of shade (trees or structures)	1	2	3	4	5	1	2	3	4	5	
Bird watching infrastructure (observation deck, rotunda)	1	2	3	4	5	1	2	3	4	5	
Children's playground(s)	1	2	3	4	5	1	2	3	4	5	
Directional signs within the park	1	2	3	4	5	1	2	3	4	5	
Dog exercise area	1	2	3	4	5	1	2	3	4	5	
Ease of access to and around the site	1	2	3	4	5	1	2	3	4	5	

Figure 1. An extract from the survey question used to gather data regarding visitor perceptions of the Importance of attributes of the Lake Claremont public green infrastructure (PGI) and urban nature (UN) spaces and the Performance of those attributes in meeting visitor expectations (measured as visitor satisfaction).

The 22 attributes of quality PGI spaces used to assess the perceptions of PGI users regarding the Lake Claremont PGI space are reported in Table 4, and the possible responses for the perceived importance and performance of those attributes are reported in Tables 5 and 6.

Attribute	Importance Ranking Identifier	Performance Ranking Identifier	References Reporting PGI Attribute
1. Availability of shade (trees or structures)	IA1	PA1	[19-21]
2. Bird watching infrastructure (observation deck, rotunda)	IA2	PA2	[22-25]
3. Children's playground(s)	IA3	PA3	[19,24,26–30]
4. Directional signs within the park	IA4	PA4	[19,22,31–33]
5. Dog exercise area	IA5	PA5	[19,34]
6. Ease of access to and around the site	IA6	PA6	[25,30,35–38]
7. Fencing	IA7	PA7	[19]
8. High quality European/English-themed spaces and areas	IA8	PA8	[21,34,39-43]
9. High-quality infrastructure (paths, lights, toilets, barbeque (BBQ), benches)	IA9	PA9	[31,33,42-48]
10. High-quality lake water body	IA10	PA10	[3,49–51]
11. High-quality nature spaces and areas	IA11	PA11	[23,26,30,43,46,52-54]
12. High-quality services (café, gym, golf club)	IA12	PA12	[24,31,33,42,44-48]
13. High-quality turf	IA13	PA13	[19,33,34]
14. Interpretive information and signs	IA14	PA14	[19]
15. Native fauna presence and activity	IA15	PA15	[3,22–24]
16. Off-leash dog exercise	IA16	PA16	[19,34]
17. On-leash dog walking	IA17	PA17	[19,34]
18. Other sporting installations (Aquatic Centre, Cricket/Hockey Oval, and/or Tennis Club)	IA18	PA18	Site-Specific
19. Par 3 Golf Course	IA19	PA19	Site-Specific
20. Park exercise equipment	IA20	PA20	Site-Specific
21. Personal safety	IA21	PA21	[32,33,43]
22. Tree management	IA22	PA22	[20-22,30,42,45,55]

Table 4. The metadata specification for identifiers of Importance and Performance ranking data.

Table 5. The metadata specification for Importance of Attributes ranking data.

Importance Ranking Identifier	Data Type	Data Values
IA1 to IA22	Categorical	1 = Not at all important 2 = Not very important 3 = Somewhat important 4 = Very important 5 = Extremely important

Table 6. The metadata specification for Performance of Attributes ranking data.

Performance Ranking Identifier	Data Type	Data Values
PA1 to PA22	Categorical	 1 = Not at all satisfied 2 = Not very satisfied 3 = Somewhat satisfied 4 = Very satisfied 5 = Extremely satisfied 0 = Unable to report

3. Methods

3.1. Study Site

The visitor satisfaction data reported in this Data Descriptor were collected at the Lake Claremont PGI and UN space in Perth, Western Australia (31.9738° S, 115.7771° E). Additional information regarding the location, land-use history, current condition, and utilization of the mixed-use Lake Claremont PGI and UN spaces are provided in Parker [10], Parker and Simpson [12], and Simpson and Newsome [3]. Location and surrounding land-use maps are provided in Simpson and Newsome [3] and Parker and Simpson [12], respectively. The following paragraph provides a short summary of the geomorphology and vegetation of the study site.

Lake Claremont is located on the Tamala Limestone zone of the Swan Coastal Plain at the boundary of the Quinadlaup Dune System and the older Spearwood Dune System [3,56]. Under the Koppen climate classification, the Southwest of Western Australia experiences a Mediterranean climate with hot dry summers and cooler wetter winters [18,57,58]. The traditional custodians of the

land, the people of the Noongar nation, identify six seasons for this region [58,59]. Prior to European colonization, the indigenous vegetation of the region was a mix of *Agonis* and Tuart Woodlands and *Banksia* Woodlands [3,60–62]. As described by Simpson and Newsome [3], the site was heavily modified and degraded as a result of European colonization. Today, the vegetation present at the site is a mix of remnant and renatured indigenous vegetation in the UN spaces to the west and north of the lake, while the eastern and southern sides of the lake consist primarily of grassed areas with a mix of trees that are exotic, local native, and out-of-area 'native' species [3]. Lake Claremont is listed as a Conservation Category Wetland in the Government of Western Australia Geomorphic Wetlands: Swan Coastal Plain dataset [3,63]. The remnant and renatured indigenous vegetation under the Bush Forever Site 220 and Environmentally Sensitive Area classifications of the Government of Western Australia and through the Government of Australia's classification of the remnant Banksia Woodland of the Swan Coastal Plain as an Endangered Ecological Community [3,64–66].

3.2. Survey

To inform the development of the survey questionnaire, relevant literature was consulted [11,13] guided by Pickering and Byrne [67] and the PRISMA method of Moher et al. [68]. The sourced literature revealed a number of universally recognized PGI features, such as access paths, open turf areas, seating, infrastructure, and playgrounds. These universally recognized PGI features were assessed in terms of their presence at the Lake Claremont study site and suitability for inclusion in the IPA question of the survey. The questionnaire asked three tick-box categorical demographic questions (Tables 1–3) and one IPA question (Figure 1). The demographic question regarding a usual place of residence of the participant included an open-ended aspect that allowed participants to share the suburb, town, Australian state, and/or country that represented their usual place of residence. The IPA question assessed the perceptions of PGI users regarding the importance and performance of 22 attributes of quality PGI spaces (Tables 4–6) that were rated on a five-point Likert scale for importance and a six-point Likert scale, which incorporated an *Unable to Report* option, for performance.

A power analysis was undertaken prior to surveying to ensure that sufficient participant numbers would be achieved to allow for valid inferences to be drawn from the results [69]. It was determined that 259 participants were required to be 90% confident that detected differences between the performance of attributes were a valid effect at an $\alpha = 0.05$ level of statistical significance assuming a correlation of $\rho = 0.2$ between the Importance and Performance rankings of survey participants. The responses from 393 analyzable questionnaires are shared via the dataset connected to this Data Descriptor.

Participants were recruited through a convenience intercept approach to surveying PGI users. Several survey events were scheduled at differing times of the day and across all days of the week during December 2016 and January 2017 to limit the potential for response bias and cognitive bias (i.e., an elevated response of participants during the festive season or weekends in comparison to day-to-day life).

Once completed, participants immediately returned their anonymous, self-reported, pen-and-paper-based questionnaires to the researchers who secured the questionnaire for later transcription of the data. After each field survey event, de-identified responses of participants were recorded in an Excel workbook for analysis and storage.

3.3. Limitations and Learnings

The survey reported in this Data Descriptor and the research article of Parker and Simpson [12] was the first time that either author had utilized the IPA technique. For that reason, the authors adapted the questionnaire developed and tested by others to conduct the IPA study reported in Newsome et al. [14] for their PGI research. Unfortunately, only after the data collection phase of the PGI survey was completed did it become apparent that there was a non-fatal flaw in the design of the

IPA question from the survey of Newsome et al. [14] that had consequently been carried over to the PGI survey.

Two important, but rarely considered, assumptions that underpin the Likert scale are that the ordinal categories have the same *span* or *intensity* and that the mid-point of the scale is a neutral inflection point between the negative response categories and positive response categories [70–72]. Those assumptions are generally met by constructing a Likert scale with an equal number of matched positive and negative categories. The assumption of a neutral mid-point is met either by providing an explicitly stated neutral mid-point on a Likert scale with an odd number of categories, or implicitly through the use of a *forced-choice* Likert scale that has an even number of categories [70,73]. As its name suggests, a forced-choice Likert scale requires survey participants to express either a positive or a negative view either side of the unstated neutral mid-point. The combination of these two assumptions provides the opportunity for a linear relationship to exist between the importance and performance of the assessed attributes that is implicit in a Martilla and James [74] IPA Matrix [10,16,75].

It will now be self-evident that the IPA question presented in Figure 1 utilities a forced-choice Likert scale with three positive response categories and just two negative response categories. While not fatal for the IPAs presented in Newsome et al. [14] and Parker and Simpson [12], it does mean that the negative ordinal categories of the dataset shared in this Data Descriptor span a slightly wider range than the span for the positive categories, and the mid-point of the scale has a value of 2.5 rather than the value of 3 as would normally apply for a 5-point Likert scale.

Supplementary Materials: Lake Claremont IPA Dataset.csv is available online at http://www.mdpi.com/2306-5729/3/4/69/s1.

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