



Factors impacting urban greenspace usage: new evidence from South Africa

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Abstract This paper examines the factors that impact urban greenspace (UGS) usage in three urban parks in the city of Tshwane, South Africa. Guided by systems theory, we aim to determine how various cultural ecosystem services afforded by these parks influence usage with a particular focus on social relations, recreation, aesthetics, and spiritual value. Data for the study was collected using an online survey as well as online reviews of the UGSs from three different sources. Site visits were also conducted to verify the presence (or absence) of various tangible factors that could impact usage. Using correlation analysis, we determined that recreation was the primary cultural ecosystem service offered by these spaces that individuals consider when deciding whether to use an UGS. Moreover, UGSs that are accessible, perceptibly safe, and well-maintained generally attract park usage while UGSs that are perceived as being unsafe, neglected, and/or polluted generally deter park use. We conclude the study by making a series

of recommendations that could encourage UGS usage in this unique context in South Africa.

Keywords Urban greenspaces · Ecosystem services · Tshwane · Parks

Introduction

Urban sustainability aims to improve the social, economic, and environmental conditions of a city in order to ensure the quality of life for residents. It does this by, among others, promoting physical and mental well-being (Wu, 2014), while attempting to avoid negative social and/or environmental impacts (Hamilton et al., 2002). A sustainable urban environment is one in which there is a reciprocal flow between various ecosystem services offered by the environment and the well-being of individuals. That is, ecosystem services should contribute to the well-being of individuals (Jax, et al., 2013), but should also provide benefits to their broader communities, and their economies (Boyd & Banzhaf, 2007). Importantly, ecosystem services incorporate both artificial (humanmade) and ecological infrastructures. The former involves services such as urban landscapes and water provision while the latter encompasses, among others, all greenspaces found in peri-urban and urban regions, such as gardens, urban lots, green roofs, and parks.

Urban green spaces (UGSs) in particular serve a vital role in the social, economic, cultural, and

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environmental aspects of urban sustainability. They are the primary pillar for a sustainable urban place for individuals in that they enhance individuals' mental (Houlden et al., 2018; Zhang et al., 2020) as well as physical well-being (D'Alessandro et al., 2015; Ward et al., 2016). A large number of studies have found that various factors can both increase and decrease the role that UGSs can play in improving the overall wellbeing of individuals. For example, UGSs that are accessible (Cohen, et al., 2003), safe (Kaczynski & Henderson, 2007), and aesthetically pleasing (Kuo & Sullivan, 2001) have been found to increase UGS usage and hence well-being, while UGSs that are poorly maintained (Ward Thompson, et al., 2012), lack amenities/facilities (Veitch et al., 2022), and have excessive noise and pollution (Dzhambov & Dimitrova, 2015) been found to deter people from utilizing them for recreational and/or relaxation purposes. Socioeconomic disparities can also play a significant role in UGS usage, as marginalized communities may have limited access to quality UGSs due to financial constraints and/or geographic location (Rigolon, 2016). Furthermore, safety concerns, such as crime or perceived risks have been found to discourage individuals from utilizing UGSs (Kondo et al., 2018). Last, inadequate urban planning or zoning regulations may result in UGSs being overshadowed by infrastructure or commercial developments, diminishing their capacity to provide natural respite in urban environments (Gong et al., 2016). Despite much being known about the importance of UGSs and the factors that drive their usage internationally, there is limited evidence on what drives their usage in Africa more generally, and South Africa specifically. This is important to ascertain as it would provide a measure of generalizability and academic credibility to existing studies that have clearly delineated the various factors driving UGS usage in more developed contexts.

The aim of this research is to examine individuals' use of UGSs in the city of Tshwane, South Africa. Using systems theory as a guiding framework, we attempt to identify the factors that encourage or discourage the use of three UGSs in the city: Magnolia Dell Park, Venning Park, and Springbok Park. Systems theory provides a holistic framework for understanding the interactions and dynamics between various components within any given system, including humans, ecosystems, and the built environment. In

the context of UGSs, this perspective highlights the intricate relationships between ecological processes, and human activities while acknowledging the emergence of complex behaviours and perceptions that may arise in these spaces. By applying systems theory to the use of UGSs, planners, policymakers, and stakeholders we hope, in this study, to gain valuable insights into the complex relationships that shape the utilisation and management of these vital urban assets.

Literature review

Urban green spaces (UGSs) provide a range of benefits through the various cultural ecosystem services they offer. Cultural ecosystem services are non-material benefits that individuals obtain from ecosystems and can be related to cultural, spiritual, recreational, and aesthetic values. Importantly, these benefits have been found to influence individuals' decisions to use an UGS (see Breuste et al., 2013; Pinto et al., 2021). Previous research has also found how individuals ascribe different cultural ecosystem 'values' to different types of UGSs. For example, Ko and Son (2018) found that individuals associated spiritual and social relations value to urban parks but not other UGSs, whereas Gottwald et al. (2021) found that spiritual and social relations values were associated to river landscapes in Germany but not other types of UGSs. In this study we aim to determine how various cultural ecosystem services influence individuals' use of UGSs with a particular focus on four types of services: social relations, recreation, aesthetics, and their spiritual value. *Social relations* highlights the role that UGSs play in promoting social cohesion, equity, and well-being within communities while *recreation* refers to the role that UGSs play in providing opportunities for leisure activities, physical exercise, and outdoor recreation. The *aesthetic* value of UGS usage emphasises the importance of preserving and enhancing the visual beauty, sensory richness, and cultural significance of UGSs while the *spiritual* value facilitates the spiritual stability of the space. Collectively, cultural ecosystem services are deeply intertwined with systems theory, as both concepts recognize the interconnectedness and complexity of relationships between human societies and their environment.

Associated factors impacting UGS usage

Embedded within cultural ecosystem services, a range of factors have been found to influence the use of UGSs including the size of the UGS (Giles-Corti et al., 2005; Gozalo et al., 2019), the number, and quality of amenities and services provided (McCormack et al., 2010), the range of infrastructures offered (Campagnaro et al., 2020; de la Barrera et al., 2016), as well as the perceived safety of the UGS (Lapham, et al., 2016). Other factors such as accessibility (Krajer Ostoić et al., 2020; Seaman et al., 2010), and the presence of vegetation (Giles-Corti et al., 2005; Krajer Ostoić et al., 2020), have also been found to play a role.

Regarding the socio-demographic profile of users, a range of factors have been found to impact UGS usage. In general, males (Wendel et al., 2012), the young (Kemperman & Timmermans, 2006), the employed (Bedimo-Rung et al., 2005), and the well-educated (Schipperijn et al., 2010) are more likely to use UGSs than others, although there are a few exceptions (see Garcia-Ramon et al., 2004). Importantly, these factors are often moderated by other factors. For example, Schipperijn et al. (2010) found that as age increases, the probability of UGS usage increases until a certain age but only for males whereas Wang et al. (2023) found that the utilisation of urban parks differed depending on the intentions of users. The results of this collective work suggest that the benefits of UGS use may not accrue equally to all sectors of society but rather favour certain segments of society over others and for certain reasons. While this large body of work has highlighted important factors related to UGS usage globally, it is largely unknown which environmental and socio-demographic factors motivate UGS usage in Africa in general, and South Africa, specifically. In fact, studies examining urban green infrastructure usage and associated ecosystem services in sub-Saharan Africa are rare. A review of studies in sub-Saharan African cities by du Toit et al. (2018) found that only 68 studies have ever been undertaken. In fact, only 38% of sub-Saharan countries have had any research carried out examining the potential of UGSs to provide multiple ecosystem services to benefit the urban population. The results of studies that have been undertaken have found recreation, and aesthetic value to be the main motivating factors driving UGS usage for residents

(see Adekunle et al., 2013; Cilliers & Cilliers, 2015; Dumenu, 2013; Rabare et al., 2009). Other factors were, however, context-specific with social cohesion, education and tourism also considered important in a small number of sub-Saharan African countries (Rabare et al., 2009; Sutherland et al., 2016) while the provision of the provision of heritage, cultural and historical values motivated others (Munien et al., 2015; Shackleton et al., 2014). With specific reference to South Africa, studies have mainly found recreation and aesthetic value to be by far the most assessed cultural services from UGSs (see Cilliers & Cilliers, 2015; de Wit et al., 2012; Munien et al., 2015; Richardson & Shackleton, 2014). Notably, a study by Shackleton and Blair (2013) found a decrease in public green space use in underprivileged neighbourhoods in the country. The researchers suggested that this was a significant reflection of not only their scarcity in these locations but also of the lack of maintenance and inadequate amenities by local inhabitants, which led to some residents travelling to other suburbs with higher perceived quality and amenities.

Study site

The geographical focus area for this study is the city of Tshwane (Pretoria) in South Africa. Tshwane is the capital city of the country and is located in the central Gauteng province. Specifically, we focus on three urban parks located within Tshwane namely Magnolia Dell Park, Venning Park, and Springbok Park. Figure 1 shows the location of all the parks in the city of Tshwane. All three parks are located in separate neighbourhoods of Tshwane but all are within a few kilometres of each other and are all within ten kilometres to the Tshwane central business district (CBD).

Figure 2 shows an aerial view of Magnolia Dell Park. The park is approximately three hectares in size and is predominantly an open space consisting of trees, grass areas and a small stream running. The park has various restroom facilities, seating areas and lighting, as well as a formal restaurant.

Figure 3 shows an aerial view of Venning Park. The park is located in the neighbourhood of Arcadia and is also three hectares in size consisting predominantly of large open green areas. It has a rectangular, symmetrical layout with a classical structural design. The park has numerous formal walkways and

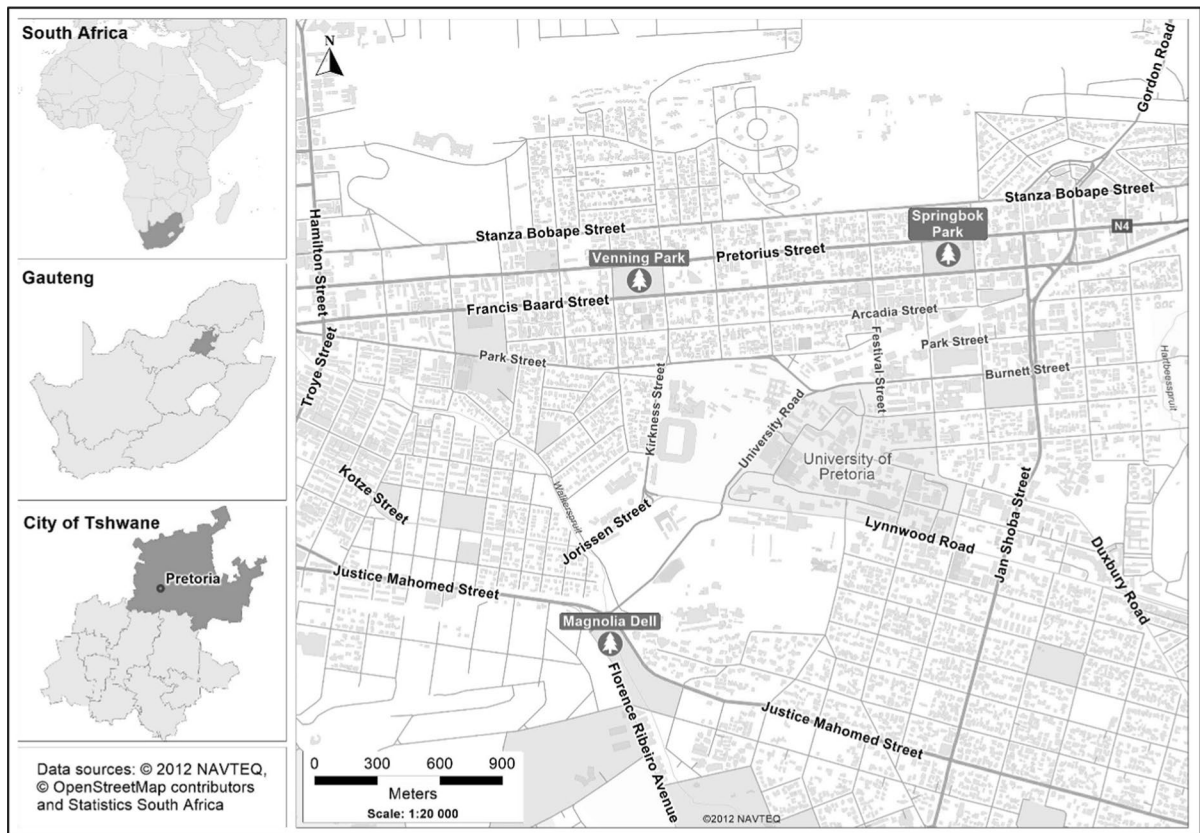


Fig. 1 Location of the study sites in Tshwane, South Africa

a humanmade water body located in the centre of the park. The park has numerous kiosks and coffee shops that cater for a range of activities. Similar to Magnolia Dell Park, there are numerous lighting sources and areas for seating.

Finally, Springbok Park shown in Fig. 4 is located in the neighbourhood of Hatfield and is marginally bigger than the two other parks at 3.1 hectares in size. The park is a well-established rectangular park, characterised by dense vegetation, and a small restaurant located on the north-eastern periphery.

Material and methods

Data on UGS usage in this study was obtained from three sources. First, an online survey was constructed and distributed to participants in August 2022 using various social media channels. Similar to previous research of this nature (see Dowelani et al., 2022;

Dusek et al., 2015; Leighton et al., 2021), a non-probability snowball sampling strategy was employed mainly because the research population was niche, and difficult to reach. The only qualifying criteria were that participants had to have visited at least one of the three parks over the past year, and that the participants were above the age of 18. The survey itself consisted of a number of sections. The first section asked questions pertaining to the socio-demographic profile of the participant (i.e., age, gender, level of education) while the second section focused on the park usage (i.e., frequency of use). The third section asked questions regarding the participants' perceived knowledge of the attributes of the park (i.e., available infrastructures and amenities) while the fourth section asked questions related to the provision of cultural ecosystem services offered by each park (e.g., *I visit the park because it is beautiful; I visit the park because it has outdoor spaces for recreation and leisure*). Answers to the questions in section four were



Fig. 2 Aerial view of Magnolia Dell Park

provided in a Likert-type scale ranging from 1 to 5 where 1 equal strongly disagree, and 5 equals strongly agree. One open-ended question was appended to the survey which allowed participants to ask and/or expand on any other aspect of the study. A copy of the survey is available from the author/s upon request. A total of 30 individuals participated in the online survey.

We readily acknowledge that the sample for the study is small. This was largely due to the fact that the research population under investigation for inclusion in the study was niche, and relatively hard to reach. While larger sample sizes generally increase statistical power and generalisability, small samples can still provide valuable insights, especially when appropriate methods are used—as was the case in this study. Indeed, a sample size of 30 meets the minimum requirements for correlation studies (which was used in this study) (Fraenkel et al., 2015) with similar sample sizes being used in previous research (see Bishop et al., 2022; Rafi et al., 2020). In our analysis the statistical significance at both the 0.05 and 0.01 levels

supports the findings' robustness, and the sample size of 30 provides reasonable power for our exploratory study.

Second, a series of online reviews of the parks were obtained from three sources: *TripAdvisor*, *Africabz* and *Google Maps*. Information pertaining to these reviews were extracted using *Apify* which is a web scraping and automation tool that enables users to extract data from websites. The online reviews were included in this study to highlight colloquial perspectives and experiences held by users of the park. The popular visiting times were obtained from this extraction and this information was transformed into a heatmap table indicating the times that reviewers most often visited the three parks. Moreover, the review ratings (between 1 and 5) for each park provided by users were extracted and graphed. A total of 2898 online reviews were obtained. Finally, a site visit was conducted to each park to verify the presence (or absence) of various tangible factors that could impact urban greenspace usage. In terms of analysis, a Spearman's Rho correlation analyses were conducted in order to determine any potential



Fig. 3 Aerial view of Venning Park

significant statistical associations between frequency of park visit and the four types of cultural ecosystem services under investigation, namely social relations, recreation, aesthetics, and their spiritual value. That is, we correlated the number of times participants frequented a park with a survey question aligned to a particular cultural ecosystem service offered by the park. We also ran correlations between frequency of park use and the various UGS attributes offered by each park as well as between the cultural ecosystem services and the various UGS attributes offered by the parks themselves. Our intention here is simply to provide some initial indication of what motivates UGS usage using rudimentary analytics. Future research could aim to use more advanced statistical analyses to identify other potential motivations.

Results

Online survey

In terms of the socio-demographics, fifteen males and fifteen females completed the online survey. Fifteen participants were aged between 18 and 28; thirteen participants were aged between 29 and 46; and two participants were aged between 47 and 58. Sixteen participants had an undergraduate degree; eight had a postgraduate degree; and six participants had a diploma. A total of nineteen participants were employed full-time, five were employed part-time; and six were unemployed. Overall, participants aged 29–46 visited parks more than other age category while, interestingly, more males than females visited



Fig. 4 Aerial view of Springbok Park

Table 1 Correlations between frequency of park use and the cultural ecosystem ($n=30$)

	Recreation	Aesthetic	Social relations	Spiritual
Park visit frequency	0.4*	0.3	0.1	0.2

* Significant at the 0.05 level

any one of the three parks. Table 1 shows the correlations between frequency of park use and the provision of various cultural ecosystem services. There was only one significant correlation with frequency of park use positively correlated with recreation. That is, parks in this study provide opportunities for recreation for users are more likely to be frequently visited than other parks. Surprisingly, none of the other cultural ecosystem services were found to be statistically significant.

Table 2 shows the correlations between frequency of park use and various UGS attributes. There was a total of four significant correlations with frequency of park use positively correlated with the size of the park, ease of access, and perceived safety of the park as well as the maintenance of parks. Parks in this

study that are accessible, perceived to be safe, and are well-maintained are more likely to be frequently visited than other parks.

Finally, Table 3 shows the correlations between the cultural ecosystem services and the various UGS attributes. This was done in order to examine whether there were any potential significant associations between various characteristics of UGSs and the services they provide. The strongest positive correlations were found between ease of access (UGS attribute), and the aesthetic and the recreational value (cultural ecosystem services) that the parks offer. Other positive correlations were found between the perceived safety of the park (UGS attribute) with the recreational value (cultural ecosystem service); and between ease of access (UGS attribute) and the spiritual value

Table 2 Correlations between frequency of park use and UGS attributes ($n = 30$)

	Users present	Park infrastruc- ture	Security infra- structure	Sport facilities	General ameni- ties	Natural infra- structure	Park size	Ease of access	Perceived safety	Maintenance
Park visit frequency	0,1	-0,4	-0,2	-0,2	-0,1	-0,2	0,5**	0,5**	0,5**	0,5**

** Significant at the 0.01 level

Table 3 Correlations between cultural ecosystem services and UGS attributes ($n = 30$)

	Users present	Park infrastruc- ture	Security infra- structure	Sport facilities	General amenities	Natural infrastruc- ture	Park size	Ease of access	Perceived safety	Maintenance
Recreation	0.1	-0.3	-0.1	-0.2	-0.2	-0.1	0.5*	0.5**	0.4*	0.4*
Aesthetic	0.1	-0.4**	-0.1	-0.3	-0.3	-0.1	0.3	0.5**	0.3	0.5*
Social relations	0.1	0.2	0.2	0.1	0.2	0.3	0.4*	0.2	0.3	-0.1
Spiritual	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.5*	0.3	0.0

** Significant at the 0.01 level

* Significant at the 0.05 level

(cultural ecosystem service) ascribed to the park, among others. One negative correlation was found between the provision of park infrastructure (UGS attribute) and the aesthetic value (cultural ecosystem service) ascribed to the park. That is, the greater the provision of infrastructure in the parks, the lower the perceived aesthetic ‘appeal’ ascribed to the park.

Online ratings review

Online reviews of the parks were generally mixed with reviewers highlighting both positive as well as negative aspects of each respective park in their commentary. Reasons for visiting the parks were mainly related to the cultural ecosystem service of aesthetics.

“...At the time the park looked like a mini jungle and [deserted].
 So, this year [when I] visited, it looked better than the last time. Lawn cut, new flowers planted and trees also trimmed. The restaurant, also looks fresher, with slight changes there and there....” (TripAdvisor, #1, Magnolia Dell).
 “It’s clean, quiet and peaceful. Great for family picnic and there are swings and other obstacles to keep kids busy while having fun” (Africabz.com #1, Venning Park).
 “This is a beautiful park ... with great shade trees and a good variety of plants. One of the safer parks, but has been neglected” (TripAdvisor, #3, Springbok Park).

Negative reviews of the parks were mainly centred around safety concerns and the lack of environmental appeal of the parks.

“The Magnolia Dell park is an average park ... There are beautiful trees and a couple of differ-

ent big and small birds. Braaing not allowed. The stream running through the park is badly polluted”

(TripAdvisor, #2, Magnolia Dell).

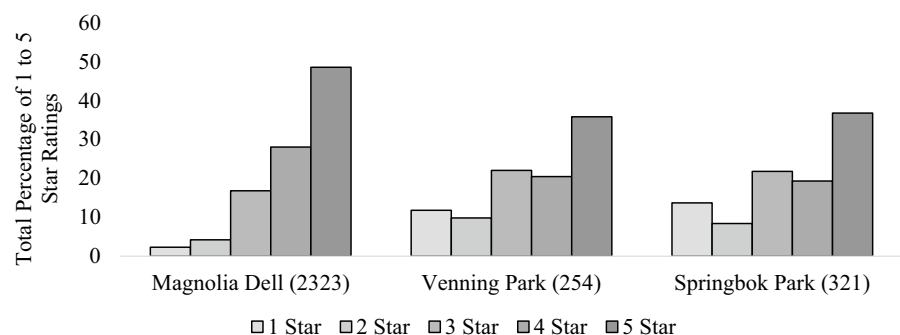
“This once beautiful park has deteriorated into a dreadful jungle with undesirable inhabitants scaring visitors. ... grass not cut often enough and flower beds not weeded” (Africabz.com #2, Venning Park).

“The first time I went to Springbok Park it was over grown and unkept, but in the meantime it has been looked after and cleaned up. They are also repairing the water feature, although the park is now trimmed, cut and cleared up it is still home to some of the homeless people who are part of the upkeep of the park. Fairly safe during the day but will not recommend going there after dark” (Africabz.com #3, Springbok Park).

A total of 2898 online reviews were scraped from Google Maps using Apify (Magnolia Dell Park=2323; Venning Park=254; Springbok Park=321). Figure 5 shows the review ratings provided by users (ratings ranged from 1 – 5 on Google Maps). The general sentiment for all three parks was more positive than negative Overall, Magnolia Dell Park has the highest rating with 48% of reviewers giving the park a rating of five out of five compared with 37% of reviewers (for Springbok Park) and 36% of reviewers (for Venning Park). Only 2% of reviewers gave Magnolia Dell Park a rating of one of out five, while 14% of reviewers gave Springbok Park a rating of one of out five.

Finally, Fig. 6 shows the occupancy percentage heatmaps of all three case study parks (obtained from Google Maps) in terms of the day of the week, and

Fig. 5 Star ratings for the three case study parks



		Magnolia Dell Park							Venning Park							Springbok Park						
		Day of the Week							Day of the Week							Day of the Week						
		Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
Hour of Day & Night	0:00:00	1	0	2	0	1	1	1	1	0	2	1	1	0	1	1	1	1	1	1	1	1
	1:00:00	1	0	4	1	1	2	1	3	2	5	7	4	0	3	1	1	1	1	1	1	1
	2:00:00	0	1	5	3	3	3	0	5	4	7	13	6	0	6	1	1	1	5	2	1	1
	3:00:00	3	2	8	7	6	6	3	6	7	9	18	7	0	10	6	3	3	10	6	1	4
	4:00:00	7	6	11	13	9	11	8	7	9	10	20	8	0	15	12	11	7	15	10	13	10
	5:00:00	12	12	14	20	13	18	17	7	10	11	18	9	0	20	16	19	12	19	13	37	15
	6:00:00	17	20	19	27	19	26	25	7	12	12	15	9	1	24	20	26	16	22	15	63	20
	7:00:00	20	29	23	32	25	36	31	7	12	12	12	11	4	28	23	29	19	24	15	81	24
	8:00:00	22	37	27	34	30	49	35	7	12	13	11	13	12	30	25	28	19	25	15	81	26
	9:00:00	24	43	30	34	35	66	45	8	12	14	13	16	25	30	27	25	17	25	16	66	28
	10:00:00	26	45	30	33	37	85	62	8	13	16	17	19	35	29	35	27	18	32	26	46	28
	11:00:00	27	43	29	32	37	100	78	9	15	17	21	20	35	27	55	50	42	61	47	33	26
	12:00:00	26	36	25	29	33	99	77	9	19	18	24	21	46	23	76	82	94	100	66	28	23
	13:00:00	21	28	20	24	27	80	56	9	21	19	23	19	100	18	77	82	100	93	66	25	18
	14:00:00	15	20	15	17	20	53	30	8	20	18	20	16	36	14	51	43	43	45	45	21	13
	15:00:00	8	14	10	10	14	29	11	6	14	16	15	11	2	10	20	7	6	9	18	13	8
	16:00:00	3	9	6	5	9	13	2	3	7	12	11	6	0	6	0	1	1	1	1	6	3
	17:00:00	0	6	3	1	5	6	1	1	0	8	7	1	0	4	1	1	1	1	1	0	1
	18:00:00	1	4	1	1	2	2	1	1	1	4	4	1	0	2	1	1	1	1	1	1	1
	19:00:00	1	3	1	1	1	1	1	1	1	1	2	1	0	0	1	1	1	1	1	1	1
	20:00:00	1	2	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	21:00:00	1	2	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	22:00:00	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
	23:00:00	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
		Occupancy Percentage							Occupancy Percentage							Occupancy Percentage						

Fig. 6 Occupancy percentage heatmaps for the three case study parks

hour of the day and night, per case study park. A number of interesting temporal patterns emerge when viewing the park visitation times. For Magnolia Dell Park the majority of participants visit the park during the weekend, particularly Saturday. This is also most often the case for Venning Park but there is much more variability for Springbok Park which experienced a similar percentage of park visits regardless of the day of the week, with the notable exception of Sunday. In terms of hour of the day, there are also some minor discrepancies across parks. Magnolia Dell is most popular in the late morning while Venning Park is popular among participants at lunch. Springbok Park is also popular at lunch time but has notable visits during Saturday mornings. Across

all three parks however it is notable how park usage drops dramatically during the afternoon and evening which seems to suggest that there may be a sense of unease or wariness about using parks during the night.

Site visits

Site visits to each park were undertaken in September 2022. They were undertaken in order to confirm and/or validate the responses we obtained from the online survey and reviews. Upon visitation, it is evident that all three parks are plagued with visible signs of physical and social disorder. In terms of the former, all parks have an accumulation of litter and other debris.



Fig. 7 Dilapidated restrooms at Venning Park

There is also damaged and/or broken infrastructure in Venning Park in particular which pose safety hazards to users (see Fig. 7). There is also significant overgrown vegetation, particularly at Springbok Park, which reduces visibility and could potentially be a reason for the online sentiments mentioned earlier that indicated that the park would not be safe at night (see Fig. 8). In terms of social disorder, there are anecdotal reports of these parks being a location of various nefarious behaviours and activities that disrupt the enjoyment of these spaces by visitors including public intoxication, drug dealing and use, and

Fig. 8 Outside visibility at Springbok Park



crime (Landman, 2019; Makakavhule & Landman, 2020), among others. Addressing these physical and social disorders in these parks is essential for maintaining their attractiveness, functionality, and safety, thereby enhancing the overall park experience for visitors.

Discussion

The main aim of the study was to examine UGS usage in South Africa with a focus on three urban parks in Tshwane. More specifically, we were interested in determining how various cultural ecosystem services offered by these parks influence usage with a particular focus on social relations, recreation, aesthetics, and spiritual value. In our study, we found only one significant association between UGS usage and cultural ecosystem services with UGSs that offer recreation opportunities more likely to be frequented than other parks. In truth, a reciprocal relationship may exist between UGS usage and recreation. That is, as parks offer the opportunity to engage in recreation, individuals visit more; and if individuals increasingly visit UGSs more, it may increase opportunities for recreation. Previous research has similarly found that parks that offer opportunities to engage in physical activity are more often visited than other parks across a range of contexts (see Ward Thompson, 2013; McCormack et al., 2014). Regarding the specific attributes of UGS, we found that UGSs that are accessible, safe, and well-maintained generally encourage usage while UGSs that have low visibility and that are perceived as being unsafe, and/or polluted, generally deter usage. Of course, safety

has been found to be the central factor impacting UGS usage found in both local (Jeeva & Gumbo, 2023) and international studies (de la Barrera et al., 2016; Groshong et al., 2020; Lapham et al., 2016). Again, a reciprocal relationship may exist here. That is, as the perceived safety of an UGS decreases, so too would users decreasingly visit these spaces, and as visitation decrease, so too, do potential users perceive the UGS as being increasingly unsafe. In truth, the reciprocal relationship between UGS usage and perceived safety is rooted in mutual influence: when an UGS is perceived as safe—due to good lighting, maintenance, and visible community presence—people are more likely to use it. Conversely, increased usage by the public can enhance the sense of safety, as frequent activity deters crime and creates natural surveillance. On the other hand, if an UGS is perceived as being unsafe, it tends to be underused, which can lead to neglect and potential increases in crime, further reinforcing feelings of insecurity. While UGS' generally enhance feelings of social safety (Maas et al., 2009), this effect can vary across urban and rural settings and different types of UGSs (Li et al., 2015; Maas et al., 2009). Moreover, previous research has found that the quality, accessibility, and aesthetic dimensions of UGS' can support perceptions of safety, independent of actual crime rates (Mancus & Campbell, 2018). Further research is, however, needed to fully understand the mechanisms linking greenspace, safety perceptions, and actual crime rates in a local context.

Strong positive correlations were also found between the aesthetic appeal and the recreational value of an UGS (cultural ecosystem service) and its accessibility (UGS attribute). That is, the greater the accessibility of an UGS, the greater the perceived recreational value ascribed to the space. This finding is to be expected. If access to a UGS is somehow restricted, this would negatively impact its on-site aesthetic and recreational appeal. Only one significant negative correlation was found and that was between aesthetic appeal (cultural ecosystem service) and park infrastructure (UGS attribute). That is, the greater the provision of infrastructure in the parks, the lower the perceived aesthetic value ascribed to the park. This negative correlation could possibly be explained by the quality of park infrastructure in these UGSs. In an international context, the provision of park infrastructure has been found to increase usage (see Cohen et al., 2009; Veitch et al., 2012) however in a

local context the provision of infrastructure can often mean the provision of neglected and/or dilapidated infrastructure (as seen in Fig. 7). It is being increasingly acknowledged that the type and frequency of UGS interactions can impact usage rather than these spaces simply being available (see Fuller et al., 2007; Holt et al., 2019; Liu et al., 2018; White et al., 2019). Greenspaces with old and dilapidated infrastructures and amenities may reduce certain types of behaviours and increase the perception that the space is not aesthetically pleasing. The findings of the study indicate that access, safety, and maintenance of urban green spaces plays a large role in the use of such spaces. Furthermore, recreational opportunities, offered by these spaces shows to strongly relate with park use.

Finally, there are a number of broad implications of our study for urban planning and policy. First, accessibility, safety, and maintenance are crucial attributes that significantly influence park usage, highlighting the need for urban planners to prioritise these factors when designing and managing UGSs. Parks should be well-maintained, easy to access, and designed with safety in mind to encourage frequent visitation. Second, the findings indicate that while recreational opportunities drive park use, other cultural ecosystem services (such as aesthetic and spiritual values) are also important. Urban policy should, therefore, aim to create diverse UGSs that offer a mix of recreational, aesthetic, and cultural benefits to cater to varying community needs. Moreover, the mixed sentiments in online reviews and site visit observations underscore the importance of addressing physical and social disorder in parks. Implementing strategies to reduce litter, repair infrastructure, and manage social issues can enhance the attractiveness and safety of parks, promoting more consistent usage. Last, the observed decline in park usage during evenings points to a broader issue of safety perception, suggesting that policies need to address urban security and lighting to foster a sense of safety at all hours.

Recommendations

A number of recommendations can be made based on the results of this study to encourage more UGS usage. First, UGSs should offer recreational value. While UGSs offer numerous other cultural ecosystem services, we found that the perceived provision of recreational opportunities was the most important

consideration for individuals choosing whether or not to visit an UGS, at least among our sample. In our study we did not quantify the amount of space that would be deemed acceptable for recreational purposes nor did we identify whether these spaces would necessarily require any further amenities to encourage recreational use (i.e., an outdoor gym or walking path) but it would seem reasonable to assume that the provision of more facilities and amenities would encourage further usage. Second, it is vital that UGSs are maintained. Adequate maintenance can increase UGS usage whilst simultaneously ensuring that the spaces' recreational value is visible to potential users. This could be done by ensuring that individuals can see into the UGS and that their view is not obscured by natural and humanmade infrastructure. This would also allow for recreational facilities and/or amenities offered by the UGS to be visible and, at least partially, also contribute to the perceived safety of the space (i.e., additional evidence for people to further justify the presence of park users). Third, urban planners and other key relevant stakeholders should ensure that UGSs are accessible and have enough points of entry. This will, of course, be largely dependent on the situational context of the UGSs within a particular neighbourhood but this information could feed into future policy and legislative urban planning protocols. Finally, it is imperative that UGSs are perceived as being safe. This is particularly true for a country that has among the highest crime rates in the world (South African Police Services, 2024). Increasing the perceived safety means ensuring that the UGS is maintained by cutting overgrowth (thereby ensuring visibility and providing passive surveillance), as well as fixing broken and/or inoperable infrastructure.

Based on the results of this study we propose a practical bottom-up strategy to address UGS usage, maintenance and perceived safety in Tshwane. The strategy comprises three steps: first, we propose to increase the awareness of available UGSs in the city. This can be done by launching targeted campaigns using social media, local events, and partnerships with local schools and community groups. This awareness campaign can highlight the health, environmental, and social benefits of using these spaces. Collaborating with local governments and businesses to sponsor green initiatives, such as tree planting or park clean-ups, can also attract attention. It is anticipated that consistent messaging about the positive

impact of UGS' on mental well-being and urban sustainability can inspire more people to explore and value these areas. The second step involves increasing park usage by organising group activities such as walking clubs, fitness groups, or community events in UGSs with support from the local public sector. This can be done via promotional outreach involving local neighbourhood groups and community stakeholders. However, these activities should be citizen-led. Similar strategies have been successfully used to increase UGS usage, and park-based physical activity in other contexts (see Derose et al., 2014). Citizen-led activities or events have been shown to transform UGSs into spaces that facilitate social interactions and in turn, attract more visitors (see Raap et al., 2022) and can start addressing safety concerns (see Jorgensen et al., 2012). Third, key relevant stakeholders should incentivise, and encourage additional interested parties to consider taking responsibility for the parks by, for example, contributing to the parks' maintenance. This could be done by involving interested parties in a local park rejuvenation initiative, thereby creating engagement opportunities with the community that is inclusive (see Harjanti et al., 2023). In doing so, it could foster a sense of ownership of the parks and could have positive effects on UGS usage and perceived safety. Previous survey research in South Africa has found that a sizable proportion of the population are willing to volunteer their time to assist in improving or maintaining the status of public UGS' (see Shackleton & Blair, 2013), however, it is unclear at this stage if the case will be similar to Springbok Park, Magnolia Dell park, and Venning Park.

Finally, it is important to note that a similar effort has been adopted by the local municipality through their 'Adopt-a-Spot' Programme (see City of Tshwane, 2022). The programme aims to create safe, and recreational public landscapes in the city through active participation however the programme focusses on underdeveloped, undeveloped or semi-developed municipal properties zoned as public open spaces and not existing UGSs. Moreover, the programme does not focus on increasing UGS usage but rather on removing illegal dumping, cutting grass, removing alien vegetation and performing overall management on UGSs and is not bottom up nor citizen-led. Rather a bottom-up citizen led strategy is required because it empowers local communities to shape these spaces according to their specific needs and

preferences. Our proposed approach can also foster a sense of ownership and engagement among residents, leading to more active participation in the design, maintenance, and use of these spaces.

Conclusion

The main aim of the study was to examine UGS usage by identifying the factors that encourage and/or discourage the use of three UGSs in Tshwane, South Africa. It is our opinion that the study accomplished this aim and, in doing so, has made the following small but meaningful contributions to the literature: First, recreation appears to be a significant determinant in UGS usage in this context. While this may be considered a rather trivial finding by international scholars, the fact that this study is one of the first of its kind in South Africa, and indeed Africa as a whole, makes it a significant one. Second, UGSs that are accessible, perceptibly safe and well-maintained encourage UGS use while UGSs that are perceived as being unsafe, neglected, and/or polluted generally deter park use, at least in this context. Consideration should be made in addressing these tangible deterrents in particular, to encourage future UGS use in Tshwane. We readily acknowledge that while this study is cross-sectional and the study sample is limited the results presented here, whilst preliminary, are sufficiently valuable enough to merit further investigation; and provide an important academic platform for future UGS research in the Global South more broadly, and South Africa specifically.

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Declarations

Conflict of interest The authors have no financial or non-financial interests to disclose.

Ethical approval This study involving human participants was conducted in accordance with the institutional requirements of the Faculty of Humanities at the University of Pretoria. Ethical clearance was obtained from the Faculty of Humanities: HUM026/0622.

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