

Research Paper

Attitudes and preferences towards elements of formal and informal public green spaces in two South African towns



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HIGHLIGHTS

- Attitudes towards elements (natural and artificial) in PUGS were investigated.
- PUGS in poorer neighbourhoods of two towns in the Global South were studied.
- Inclusion of informal PUGS and *peri-urban* municipal commonages as types of PUGS.
- 63% of respondents visited PUGS, with informal PUGS being the most visited.
- Safety, cultural restrictions, and lack of recreational elements deterred visitors.

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ABSTRACT

Different types of public urban green spaces (PUGS) contain various natural (such as trees, pools, flowerbeds) and artificial elements (such as benches, play equipment, fountains) which contribute to the enjoyment and experience of users. However, which elements users most require, appreciate or notice has rarely been examined as the basis of their choice for specific PUGS, especially in poorer neighbourhoods and countries, where formal PUGS may be limited. The study was carried out in two towns in the Eastern Cape province of South Africa, both characterized by high poverty and unemployment levels, low literacy rates and many people living without basic infrastructure and services. To understand the meanings people have for specific PUGS elements, formal and informal PUGS and *peri-urban* municipal commonages were assessed with respect to the natural and artificial elements present. A survey of 360 households was conducted across two towns by targeting PUGS users and households within 100 m from the designated PUGS. Approximately 63% of the respondents visited PUGS, with informal PUGS being the most frequented. However, they were strong negative feelings towards some natural elements because of their unkempt nature. Issues of safety, cultural restrictions and lack of recreational facilities were mentioned as some of the specific deterrents against visiting the closest PUGS among different user and age groups. Most respondents emphasized the need for PUGS that are well laid out with maintained lawns, recreational facilities and open vegetation. Thus, the current design and available features within the studied PUGS do not meet local preferences and needs and thus do not contribute to enjoyment as much as they could. Attention needs to be given to understand and incorporate the elements that invoke positive attitudes among urban residents.

1. Introduction

Public urban green spaces (PUGS) are increasingly recognized as important for enhancing urban dwellers' wellbeing and quality of life (Chiesura, 2004; Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Palliwoda, Kowarik, & von der Lippe, 2017; Shackleton, Blair, De Lacy

et al., 2018). Such spaces can take on many different forms, differing in location, size and also the type of natural elements (e.g., trees, water, herbs), vegetation (e.g., lawns, flowerbeds, natural woodlands) and recreational amenities (e.g., play equipment, sports facilities, seats, shelter) they contain. The number and diversity of these elements, their arrangement, design, and maintenance therefore attract or detract

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particular uses and users, and thereby evoke varying attitudes and preferences towards PUGS. For example, highly biodiverse PUGS with trees, birds and butterflies increased psychological fulfilment of users in Sheffield, United Kingdom (Fuller et al., 2007). Whilst, Nordh, Hartig, Hagerhall, & Fry (2009) showed that the percentage of grass cover, trees and bushes were predictive of the likelihood of feelings of restoration in Oslo, Stockholm and Copenhagen.

The growing understanding of how natural elements within PUGS attract or detract from particular use patterns or sentiments (Botzat, Fischer, & Kowarik, 2016; Chiesura, 2004; Fuller et al., 2007) overlooks that artificial elements and amenities are potentially as equally important, albeit less investigated (Bertram & Rehdanz, 2015; Özgür, 2011; Zhang, Chen, Sun, & Bao, 2013). For example, Özgür (2011) reported that residents of Isparta, Turkey, enjoyed to be in parks to be in contact with nature, but predominantly to be involved in passive recreational activities, and hence valued the provision of elements that prompted such, like seating, play areas for children and barbecue facilities. Therefore, it is important to understand the appreciation of both artificial and natural elements.

Not only is it necessary to understand the elements that attract users, but it is also important to identify those that deter potential users, or constrain the frequency of visits (Bjerke, Østdahl, Thrane, & Strumse, 2006; Gobster, 2002; Jorgensen, Hitchmough, & Calvert, 2002; Shackleton, Chinyimba, Hebinck, Shackleton, & Kaoma, 2015). For example, too many trees and shrubs may be associated with the potential for and fear of criminal activity (Shackleton et al., 2015; Sreetheran & van den Bosch, 2014). In South Africa, according to the Victims of Crime Survey 2016/2017, 32% of people out of a sample of 30 000 reported that they were scared to walk in PUGS as they felt they could be targets of criminals, whilst in Bari, Italy, Sanesi and Chiarello (2006) reported that 25% of respondents cited anti-social behaviours and harassment as a reason not to visit PUGS. Such anxieties and fears are stronger if the vegetation is dense (Bjerke et al., 2006; Hofmann, Westermann, Kowarik, & Van der Meer, 2012). The preference for PUGS with moderately dense woody plants therefore suggests that people prefer situations that offer "both prospect (to see) and refuge (not to be seen)" (Botzat et al., 2016: p227). The presence of derelict and vandalized elements within PUGS can result in visitors feeling disappointed and angry (Abdul Malek & Mariapan, 2009; Rupprecht, Byrne, Uede & Lo, 2015; Shackleton & Njwaxu, 2021).

Haase et al. (2014) and Botzat et al. (2016) suggest that user experiences within PUGS are highly contextual and that the landscape setting and elements within PUGS influences the nature and intensity of interactions. However, much of the literature on the perceptions, attitudes and preferences for specific elements within PUGS comes from the Global North (Botzat et al., 2016; Haase et al., 2014; Shackleton, 2012). And even within the Global South research effort to date favours the more affluent parts of towns and cities because that is frequently where most of the PUGS are located (Shackleton et al., 2018). Thus, current understandings often do not reflect the settings and realities of communities staying in lower-income areas. For example, the distribution and composition of PUGS in South Africa is plagued by the development history and legacy of apartheid which created highly uneven urban neighbourhoods with respect to urban green infrastructure (Gwedla & Shackleton, 2015; Venter, Shackleton, Van Staden, Selomane, & Masterson, 2020). This bias towards more affluent countries and neighbourhoods affects the transferability of understandings of users' experiences within PUGS as developing countries have very different socio-economic contexts (Keniger, Gaston, Irvine, & Fuller, 2013; Shackleton, 2012) and cultural and spiritual requirements (Cocks & Shackleton, 2021).

The Global North literature also focuses mostly on formal PUGS which are planned, clearly demarcated and variously managed, inclusive of parks, botanical gardens, urban forests and cemeteries (Schipperijn, 2010). Markedly less attention has been given to informal PUGS, although Rupprecht, Byrne, Uede, et al. (2015) assert that informal PUGS are an unquestionable part of everyday life and an important

feature of PUGS. In addition, such informal PUGS may constitute a large proportion or the majority of PUGS available to urban dwellers, especially in poorer settings (Radebe, 2018). In studying informal PUGS, the absence of a widely accepted formal definition and classification continues to give rise to a variety of names of informal PUGS like urban wilderness, urban wasteland and urban wildscapes (Rupprecht, Byrne, Garden, & Hero, 2015). Yet, other scholars like Rupprecht & Byrne (2014), operationalize informal PUGS as 'in-between' or liminal vegetated areas within towns and cities, such as riparian zones, servitudes, vacant lots and spaces in-between buildings and temporary or permanently unmanaged and undeveloped spaces. Breuste, Niemelä, & Snep (2008) define informal PUGS as PUGS which are less tailored than the formal green spaces and consist of both native and non-native vegetation and distinctive urban environments (Rupprecht, Byrne, Uede, et al., 2015). Moreover, Rupprecht, Byrne, Uede, et al. (2015) introduce the dimension of human impact, hence defining informal green spaces as any urban space with a history of strong human disturbance that is covered at least partly with non-remnant, spontaneous vegetation. In our study we borrow perspectives from elsewhere in the world (Breuste et al., 2008; Qureshi, Breuste, & Lindley, 2010; Rupprecht & Byrne, 2014; Rupprecht, Byrne, Garden, et al., 2015) in studying informal PUGS, and considered informal PUGS as PUGS that are not 'clearly' demarcated as formal parks and recreational playing areas according to the municipal zonation plan.

In Sub-Saharan Africa, only a few studies report on the experiences of PUGS users (Fuwape & Onyekwelu, 2011; Mensah, 2014), and most of these emanate from South Africa (Adegun, 2018; Cilliers, Cilliers, Lubbe, & Siebert, 2013; Shackleton & Blair, 2013). Yet, none have examined the specific elements of formal and informal PUGS which serve to attract, deter or shape experiences and perceptions of PUGS. Consequently, the objective of this study was to determine the natural and artificial elements that contribute to users' sense of enjoyment (or not) of formal and informal PUGS and municipal commonages within a Global South context. Since formal PUGS are lacking in the poorer neighbourhoods of many South African towns (McConnachie, Shackleton, & McGregor, 2008; Radebe, 2018; Venter et al., 2020), we included peri-municipal commonages in the research as these are the only PUGS easily accessible to many. In South Africa, municipal commonages are generally large, continuous PUGS on the periphery of urban areas under the nominal management of the urban authorities. They are used for urban expansion, recreation, grazing of livestock, cultural traditions and harvesting of wild natural resources (Cocks, Shackleton, Walsh, Haynes, Manyani, & Radebe, 2021; Davenport, Gambiza, & Shackleton, 2011).

2. Methods

2.1. Study area

The study was conducted in the towns of Komani (formerly Queenstown; 31°54'0"S, 26° 53'0"E) and Qonce (formerly King Williams Town; 32°53'0"S, 27° 24'0"E) situated in the Eastern Cape province of South Africa Fig. 1. The Eastern Cape is the second largest province by land area (StatsSA, 2016) and has approximately 6.2 million inhabitants, of which 38% live in urban areas (ECPC, 2014; StatsSA, 2016). Komani is situated 1 750 m above sea level and receives a mean of 400 mm of rainfall per year, mostly during the summer (Oct – May). The average midday temperatures for Komani range from 16.8 °C in June to 27.6 °C in January. Qonce stands at 398 m a.s.l and enjoys about 502 mm rainfall per year, mostly in summer. The average midday temperatures for Qonce range from 19.7 °C in July to 26.7 °C in February. Komani has approximately 130 000 inhabitants, and Qonce 120 000 (StatsSA, 2016). Within each town three poorer neighbourhoods were purposively selected, where most residents were isiXhosa speaking, black South Africans. In Komani they were Mlungisi, Ezibeleni and Aloevale. In Qonce sampling was in Ginsberg, Sweetwaters and Zwelitsha.

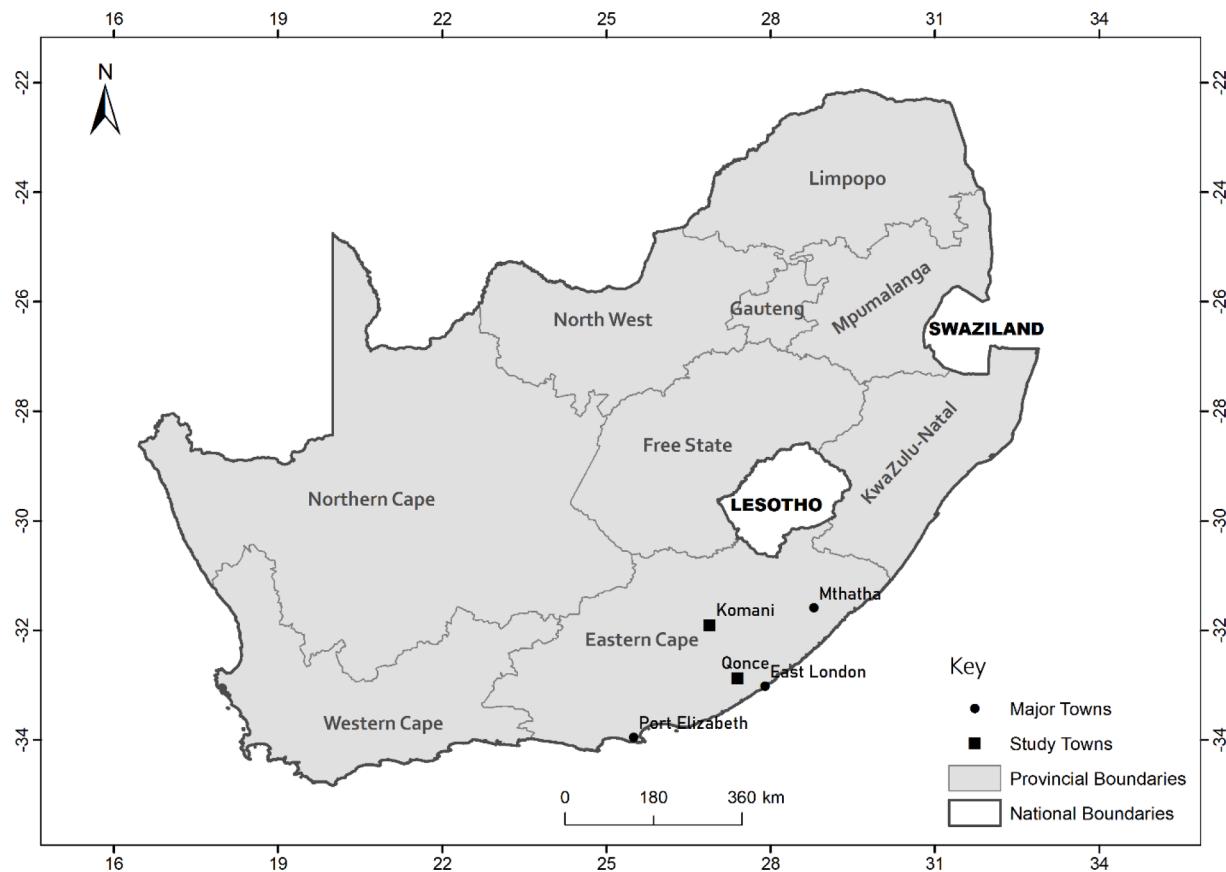


Fig. 1. Location of Komani and Qonce in the Eastern Cape, South Africa.

Both towns have similar political and cultural histories relating to the apartheid period (mid-1940s to mid-1990s). Apartheid was the period when South Africa was governed by the white minority and marked by repressive racial segregation (Goebel, 2007; Wilkinson, 1998). The apartheid era restricted free movement of black citizens from rural areas to urban areas for several decades (Shackleton et al., 2014; Wilkinson, 1998), and those in the urban areas for employment were restricted to living in racially segregated suburbs, locally termed townships (Wilkinson, 1998). Townships were, and still are to a large extent, characterised by high density housing, poverty, underdevelopment, limited commercial or economic hubs and few or no formal PUGS (McConachie & Shackleton, 2010; Shackleton et al., 2014). Post-apartheid, the government sought to improve urban living conditions by a national Reconstruction and Development Programme (RDP), which sought to address backlogs of service provision and housing (Wilkinson, 1998). The resulting social-housing areas are locally termed RDP neighbourhoods, with priority for housing units given to the indigent.

The neighbourhoods selected for the study have some of the highest poverty levels in South Africa, with high proportions of unemployed young people, low literacy rates, low levels of employment and 47% of the population living below the poverty line (Phaswana-Mafuya, Seager, Peltzer, Jooste, & Mkhonto, 2010; ECPC, 2014). Government social grants, in the form of old age grants, disability grants, foster and child grants, play a pivotal role in supporting households (Department of Rural Development and Land Reform (DRDLR), 2013). The majority of the people are black African (88%). IsiXhosa is the dominant home language, and with English used for commerce and government affairs (Statistics South Africa (Stats SA), 2016). Both towns have limited PUGS, particularly within the sampled poorer neighbourhoods. The percentage cover of PUGS in the urban core in Komani is 7.5% and in Qonce its 12.3% (Radebe, 2018).

2.2. Data collection

The study was organized in three phases. In the first phase Google Earth images of Komani and Qonce were used to locate and categorize residential areas and PUGS. Residential areas were categorized as affluent, township or RDP neighbourhoods. The major townships and RDP areas were purposively selected because they house the highest populations of black South Africans. The Google Earth images were then used to identify all the PUGS in the township and RDP areas (33 in Komani and 41 in Qonce) and categorized as formal, informal or municipal commonage using the existing demarcation zones from the local municipalities and direct visits. For the second phase, each of the identified PUGS was visited. During each visit direct observations were recorded of the natural and artificial elements in each PUGS and any activities that were being done by people in the PUGS.

The third phase consisted of a household survey in each town. For the survey, nine PUGS were randomly selected in each town. For each of the selected PUGS, aerial photographs (scale 1: 5 000) were used to identify the closest households (100 m from the PUGS) and 20 households were randomly selected around PUGS (providing 60 households per neighbourhood and 180 households per town). The household survey was administered through interviews which were limited to one adult member of the household (>18 years old) willing to participate. Interviews were conducted in isiXhosa or English and lasted approximately 45–60 min. Face to face interviews were carried out and provided opportunities for respondents to ask questions of clarity, follow up questions and in some instances prompted a wider conversation about PUGS and urban life in that area. To include people who worked, the questionnaire was administered at different times of the day and different days of the week including weekends. If a household declined to participate or nobody was at home, the next household on the sample frame was approached. The questionnaire (Appendix B: Supplementary

Material) consisted of five sections which related to (1) PUGS visitation and frequency of access, (2) elements or aspects that users noticed in the formal, informal PUGS and municipal commonage and their attitudes towards such elements and preferences for their ideal elements in their own words and description, (3) the main activities undertaken in the PUGS, (4) any elements or aspects that deterred the respondents from visiting the PUGS near their home and (5) the profile of the respondent, such as gender, education, employment status and source of income.

To further understand respondent preferences for different PUGS elements, respondents were presented with four images which represented the types of PUGS available around their homes (Fig. 2), taken during the second phase of the study. The respondents took time to examine each of the four images and were invited to state what they liked or disliked about each and why. The most preferred image was recorded.

2.3. Data analysis

Initial data cleaning was conducted on Microsoft Excel 2013. The elements or aspects that people first noticed when visiting PUGS and the elements or aspects they preferred to have in the spaces were presented in frequency counts. Normality tests were conducted using the Shapiro-Wilk test. Since respondents noticed many elements or aspects when in a green space, a principal component analysis (PCA) was carried out to reduce dimensionality, hence reducing the dataset to the most important few. (Smilauer & Leps, 2014). Through the identification of clustering of variables that measure the same theme, variations with the data are optimally described. Varimax rotation was used to maximise the variance of loadings thereby aiding the classification of variables to PCs. This data reduction method results in zero correlations between the PCs.

People's attitudes towards elements within each type of PUGS were examined. A detrended canonical correspondence (DCCA) was used to establish whether linear or unimodal methods should be employed (Smilauer & Leps, 2014). Since gradient lengths from the DCCA were long, a linear redundancy analysis (RDA) model was selected to study the influence of elements within different PUGS on the attitudes of people towards these places. RDA is a constrained ordination analysis which can be seen as an extension of multiple regressions to the modelling of multivariate response data (Smilauer & Leps, 2014). The study employed a preliminary RDA to remove correlated variables (indicated by variance inflation factors above 20) and a determined eigenvalue. Stepwise manual forward selection with Monte Carlo test (with 999 permutations) was then employed to identify a minimal subset of features within PUGS that were significantly related to the various attitudes. To test for the effect of PUGS type on deterring people to the PUGS, Chi square (χ^2) analyses were used. The PCA and RDA were performed using CANOCO version 5 (Smilauer & Leps, 2014). All other statistical tests were performed in SPSS 21 (SPSS Inc., 2007, Chicago, Illinois).

3. Results

3.1. Respondent profile

Approximately three-fifths (59%) of the respondents were female (Table 1). The most common age group was the 18–35 years old (42%). Many of the respondents (46%) were unemployed.



Fig. 2. Photo choices offered to survey respondents to select which type of PUGS they preferred and why?, A-Open formal green space, B-Informal green space with dense thicket, C-Treeless play area, D-Formal space with high abundance of trees. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 1

Profile of respondents interviewed ($n = 360$) across different PUGS (formal, informal and municipal commonages) in two towns.

Attributes ($N = 360$)	Formal	Informal	Commonages	Total frequency	Total Percent
Gender: Female	63	71	78	212	58.9
Male	55	55	38	148	41.1
Age: 18–35 years	47	55	50	152	42.2
36–55 years	43	44	47	134	37.2
>56 years	28	27	19	74	20.6
Language: IsiXhosa	113	123	110	346	96.1
Other	5	3	6	14	3.9
Education level: Junior	85	73	71	228	63.9
High school/ matric	28	46	38	112	31.1
Certified/ diploma/ degree	5	7	6	18	5.0
Employment status:					
Full/part-time	37	49	39	126	35.0
Unemployed	55	52	59	166	46.1
Students	7	5	6	18	5.0
Retired/ unemployed	18	18	11	46	13.9
Main source of household income:					
Salary/wages	28	44	37	109	30.3
Government grants	24	24	14	63	17.5
Other	20	10	20	50	13.9
Not specified	32	56	50	138	38.3

3.2. Elements first noticed within the PUGS and attitudes towards such

3.2.1. Visitors observation of elements in PUGS

Almost two-thirds (63%) of the respondents had visited at least one PUGS in the previous 12 months. Informal PUGS were the most visited (40% of those who had visited PUGS). Those who visited the PUGS reported the first element they noticed as litter (134 mentions) (Table 2).

followed by the presence of children playing (95 mentions) and livestock (72 mentions). The least mentioned elements included mountains (1), firewood (5), flowers (5), open space (5) and birds (7). The most-cited natural elements observed included trees (61 mentions) and shrubs (55 mentions) and these elements were mostly in the informal PUGS and municipal commonages (Table 2).

The PUGS type strongly influenced the elements that people first observed ($\chi^2 = 165.4$; $p = 0.001$) (Fig. 3). There was an association between the artificial elements such as swings and play equipment and benches in the formal PUGS, but were not observed within informal PUGS and municipal commonages. The only natural element that was

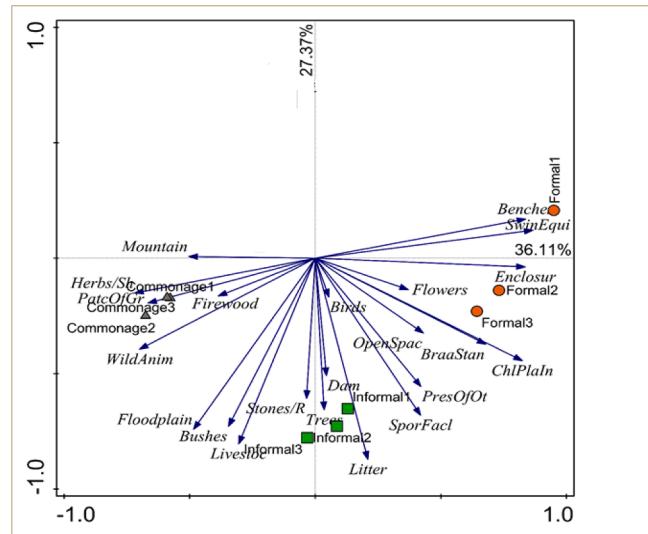


Fig. 3. Principal Component Analysis (PCA) biplot illustrating the relationship between the observed PUGS elements (blue lines projecting from the origin). Length of lines indicate the strength of the correlations between elements first noticed and formal, informal PUGS and municipal commonages. The total variance accounted for by the first two axes of the PCA was 63.5%. The elements abbreviated are written in full in Table 2. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 2

Elements first noticed in PUGS of two towns (F-formal, I-Informal, C-Commonage).

Elements in PUGS	Total no. of mentions			Element 1			Element 2			Element 3			Total			
	F	I	C	F	I	C	F	I	C	F	I	C	F	I	C	ALL
Litter	9	39	20	11	19	8	12	11	5	32	69	33	134			
Children playing	21	9	0	25	16	0	8	15	1	54	40	1	95			
Livestock	0	7	9	3	13	11	8	12	9	11	32	29	72			
Trees	6	7	7	6	5	11	9	4	6	21	16	24	61			
Bushes/shrubs	1	6	20	5	3	3	3	9	5	9	18	28	55			
Swings/play equipment	26	0	0	10	0	0	12	0	0	48	0	0	48			
People	2	5	0	5	14	5	5	5	2	12	24	7	43			
Patches of grass	0	1	5	1	0	8	1	1	9	2	2	22	26			
Floodplain	1	2	5	1	4	3	0	6	4	2	12	12	26			
Braai stands	2	2	0	4	2	0	2	4	0	8	8	0	16			
Stones/rocks/kopjes	1	3	0	0	2	1	1	4	3	2	9	4	15			
Wild animals	0	0	3	0	2	3	0	5	2	0	7	8	15			
Sports facilities	1	3	0	0	3	0	3	2	0	4	8	0	12			
Benches	4	0	0	4	0	0	4	0	0	12	0	0	12			
Enclosure/fencing	5	1	0	2	0	0	1	0	0	8	1	0	9			
Dam	0	1	0	0	4	0	1	3	0	1	8	0	9			
Birds	0	1	3	1	0	0	2	0	0	3	1	3	7			
Open space	1	1	0	1	0	0	1	1	0	3	2	0	5			
Flowers	0	1	1	1	0	0	2	0	0	3	1	1	5			
Firewood	0	1	0	0	0	0	0	0	4	0	1	4	5			
Mountain	0	0	0	0	0	1	0	0	0	0	0	1	1			

Element 1, 2 and 3 refer to the first element, second element and third element that respondents immediately observed when in the PUGS next to their residential homes. (ALL- total mentions in all spaces).

mentioned within the formal PUGS was flowers. The presence of litter was strongly associated with informal PUGS (Fig. 3), although not exclusively so. Most natural elements (e.g. trees, bushes, floodplain) had an association with informal PUGS. Municipal commonages were associated with wild animals, herbs, shrubs, grass and firewood.

3.2.2. Attitudes towards elements in PUGS

The results of the Redundancy Analysis (RDA) display the relationship between elements observed within the PUGS and attitudes towards these elements (Fig. 4). Artificial elements in functional condition, like swings, fences and benches within the formal PUGS, were associated with sentiments of happiness. Some natural elements like birds, flowers and trees were also associated with happiness; however, trees were also associated with sadness (Fig. 4). PUGS users expressed sadness mostly towards litter, vandalized facilities and anti-social behaviour within some informal spaces and commonages. Elements such as floodplains, bushes and reservoirs within informal PUGS were associated with fear amongst some respondents.

The personal narrations (see Appendix A, Table a: Supplementary Material) reveal that the formal PUGS are poorly equipped with adequate facilities or those which people prefer. For example, a resident in Qonce explains “*The park does not have facilities like gym, sports facilities and youth centre for us to go and learn different life skills rather just some broken equipment that is dangerous even for our young siblings to play on*” (18-year old woman, formal PUGS). The parks were also perceived as places which only cater for children with no facilities for the youth, middle-aged and elderly. Some elderly people mentioned that the available formal PUGS offered only children’s play equipment, with limited facilities for the elderly; for instance, a 75-year old woman in Komani acknowledged that “*This park is meant for children only, what would I do there? Am too old to be playing on swings and other play stuff, there should be benches for us old people to sit and rest and just have a place to escape to from our dying beds*”. In addition, the presence of livestock grazing in most PUGS made many feel disgusted, scared and fearful of being in the spaces. Fears about particular elements and aspects

prevented some people from visiting their nearest PUGS, for example, ‘*This space has been turned into hotspot for robbing and raping our sisters and wives because the vegetation conceals the perpetrator so you cannot see who or what is in there. We have asked the council to come and cut the vegetation but there has not been any response and even if they do, when it rains the vegetation grows fast because of the river flowing in that place*’ (34-year old man, informal PUGS, Qonce).

The ability to engage in cultural practices is a vital component of the lived reality for many Xhosa township residents. One respondent mentioned how the PUGS around them do not reflect his ideology of nature, leading to some people being estranged from nature, “*There is no nature in these spaces next to our homes; some trees which have been there were cleared when people were erecting some informal settlements, when I want to really be in nature I go to the rural areas. There is no nature in the city*” (45-year old man, informal PUGS, Komani). Another respondent shared: “*This space is the closest that resembles a natural environment to me, I grew up here in Zwelitsha and all I know is paved roads and buildings hence, this commonage makes my soul happy and at peace*” (27-year old man, commonages, Qonce). Some cultural notions, however, prevented some women from visiting the municipal commonages freely as they are not allowed near male cultural sites when certain ceremonies are being conducted, ‘*The commonages are places where men go to herd cattle and carry out the circumcision ritual, as women we are not allowed to go there because it is against our culture, moreover there have been reported incidences of rape in that area*’ (37-year-old woman, commonages, Komani). Those who visited the municipal commonages regularly are predominantly male and frequent the commonages for initiation or to help out with other boys’ initiation in the community at certain times of the year.

The issues of worldviews associated with snakes and sorcery also were raised by some respondents. For example, a dam in an informal PUGS was associated with the appearance of a snake, thus people were scared to go near the dam “*It has been rumoured that at the dam there is a snake which stays there, hence I will not go close to that space because all the rumours are associated with sorcery*” (61 year old male, Komani, informal PUGS). On the other hand, municipal commonages were the only places considered as natural environments, allowing people to enjoy several benefits like collecting firewood, fruits and medicinal plants. Many respondents, irrespective of age or gender, felt that the pocket of PUGS next to their home was the only or closest resemblance of a natural setting.

3.3. Preferences to elements within PUGS

Most of the respondents regarded PUGS as important play areas for children, and hence the most preferred elements were swings and play equipment (101 mentions). The association of PUGS with play areas for children also underpinned that respondents preferred that PUGS should be enclosed and monitored by a security guard (75 and 40 mentions, respectively). This was also supported by sentiments shared by a 32 year old woman in Qonce: “*This park is the only close place where my children can go and play in whilst I monitor them because other children play in streets and roads and that is not safe*”. The only natural element mentioned as preferred by respondents was the presence of trees (34 mentions) (Appendix A, Table b: Supplementary Material). The preferred elements mentioned the least were information/education boards, birds, a paved pathway and a parking space, all with less than five mentions. The PCA clearly demonstrates that the type of PUGS has an influence on the various elements that respondents prefer (Fig. 5). More specifically, there is a high correlation between artificial elements (e.g., swings, play equipment, benches, flower beds, fencing, braai stands) with formal PUGS indicating a high preference for these elements by respondents. The need for trees and lawns also had a correlation with formal PUGS (Fig. 5). Within the informal PUGS, the need for sports facilities, playgrounds and lights had a correlation (Fig. 5). For municipal commonages, most respondents preferred that they be developed for service provision and built infrastructure such as clinics, community gardens

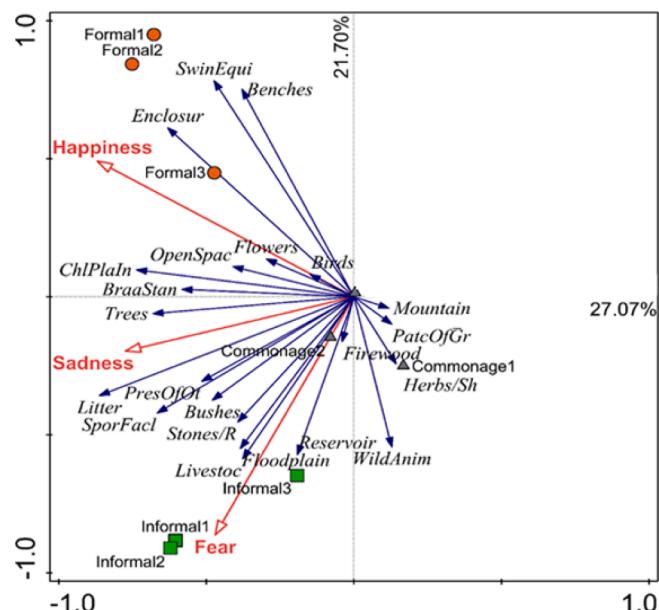


Fig. 4. Redundancy Analysis (RDA) triplot of elements within PUGS (as indicated by blue arrows) and attitudes towards them (as indicated by red arrows) against controlling variables (types of PUGS: formal, informal and municipal commonages). The first two axes of the response-explanatory relationship plot accounted for 48.8% of the total variance. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

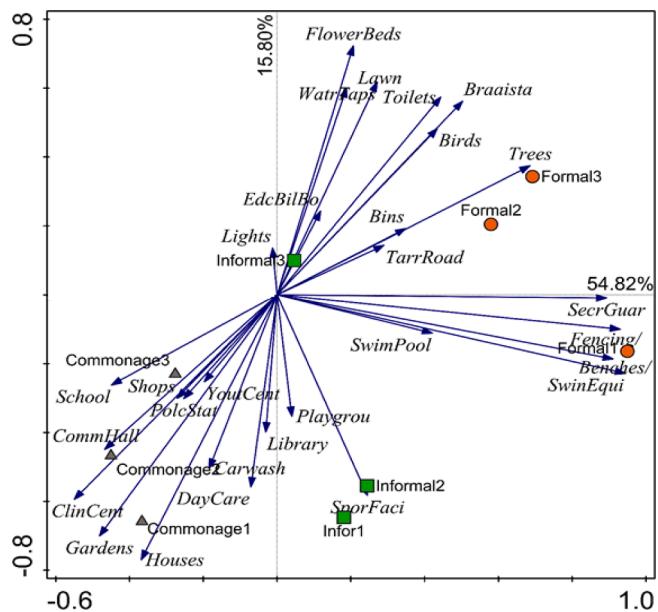


Fig. 5. Principal Component Analysis (PCA) biplot illustrating the relationship between the preferred elements (blue lines projecting from the origin, with long lines indicating stronger correlations than short lines) and type of PUGS. The total variance accounted for by the first two axes of the PCA was 70.6%. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

and schools.

3.3.1. Preferred appearance of PUGS

From the photo response exercise, most respondents (73.1%) preferred the open, formal PUGS (Fig. 2a) and 23.9% chose the PUGS that is treeless and contains swings and play equipment (Fig. 2c). The informal PUGS with dense thicket was chosen by only 0.8% (Fig. 2b). The main reason for choosing (A) was openness and spaciousness (53.1%) and safety (7.8%), whilst the treeless play area (C) was chosen for equipment for children play (15.8%) and safety (8.1%) (Appendix A, Table:c Supplementary Material).

3.4. Deterrents to visiting PUGS

Deterrent elements varied across different PUGS ($\chi^2 = 34.9$; $p = 0.01$). The main deterrent was a lack of cleaning and maintenance (Table 3). In informal PUGS and commonages the presence of dense thickets and shrubs were not favoured, as was the risk of encountering anti-social behaviour as one respond described: "It is scary to walk across this space when I am coming from school because there are guys who sit in there and they say all sorts of insults and sometimes they want to touch you even if you clearly tell them you are not interested" (19 year old woman, Qonce) (Appendix A, Table a: Supplementary Material). The presence of wild animals and vandalized structures were the least mentioned deterrents. The general pattern was that deterrents were more commonly associated with informal PUGS and commonages than formal PUGS.

Elements that deterred non-users from visiting PUGS varied across gender and age (Table 3). Generally, women felt more discouraged to visit the PUGS because of the lack of maintenance (70.2%), the spatial arrangement of the vegetation (60.7%) and fears for their safety (62.5%) within the spaces. Female users were significantly more affected by cultural restrictions (80%), thus partially limiting their visits to the municipal commonages. Whilst, males were more prone to visiting the commonage: 'I get to collect some of my favourite traditional fruits from the commonage and also sometimes I can get to escape the busy noise of the streets in the township and consult my ancestors in a way we were taught by

Table 3

The proportion of respondents by age group and gender mentioning specific deterrent elements of PUGS.

Deterring elements	Frequency	Gender		Age group		
		Males	Females	Youth	Middle-Aged	Elderly
Lack of cleaning, maintenance	49	29.8	70.2	23.4	66.0	10.6
Dense vegetation	28	39.3	60.7	25.0	39.3	35.7
Unsafe, anti-social behaviour	24	37.5	62.5	58.3	25.0	16.7
Noise	23	30.4	69.6	17.4	26.1	56.5
Absence of trees and plants	22	57.1	42.9	14.3	71.4	14.3
No recreational facilities	20	30.0	70.0	50.0	30.0	20.0
Lack of benches	6	50.0	50.0	50.0	16.7	33.3
Cultural restrictions	5	20.0	80.0	60.0	20.0	20.0
Graffiti, vandalized structures	2	0	100.0	0	100.0	0
Wild animals	2	0	100.0	100.0	0	0

our great grand fathers' (59-year old man, municipal commonage, Komani) (Appendix A, Table a: Supplementary Material). Generally, both women and men were deterred by the lack of maintenance of the PUGS studied. With regards to age, the youth were deterred the most from visiting PUGS by cultural restrictions (60.0%), unsafe and anti-social behaviour (58.3%) and limited recreational facilities (50.0%). In contrast, the middle-aged cited an absence of trees and plants (71.4%) and lack of cleaning and maintenance (66.0%) as some of the highest deterrents. In contrast, the elderly non-users cited noise (56.5%) as a significant deterrent followed the dense vegetation (35.7%).

4. Discussion

4.1. Visitation of the PUGS

The results provide insights into the visitation patterns to PUGS. This study has shown that 63% of residents had visited the PUGS closest to them in the previous 12 months. Of this 63%, the largest number visited informal PUGS. This departs from previous studies (Chiesura, 2004; Fuller et al., 2007; Palliwoda et al., 2017) in the Global North where people mostly visit formal PUGS. By incorporating the informal PUGS and municipal commonages in this study we expand the level of knowledge on the visitation patterns of people to PUGS, particularly in the South African context. Also, incorporation of these less studied types of informal PUGS is useful for comparison of different attitudes and preferences to elements within PUGS in the low-income areas.

Echoing findings from other studies (Adinolfi, Suárez-cáceres, & Cari, 2014; Özgürer, 2011; Sanesi & Chiarello, 2006), the results show that 37% of the respondents who did not visit any PUGS in the last 12 months stated that they had wished to visit PUGS but were deterred by poor maintenance and anxieties around crime. Respondents in the study mentioned the need for security guards and fencing of the PUGS to feel safe. This is consistent with findings by Sanesi and Chiarello (2006) who revealed that PUGS users in Bari, Italy, preferred PUGS with increased surveillance and policing to prevent anti-social behaviour. Thus, people preferred open, dispersed vegetation, particularly for safety reasons. Moreover, our results also show that some users were deterred by a lack of recreational elements within PUGS, which was also found by Adinolfi

et al. (2014) in Granada, Spain. Some of the deterrents listed, such as cultural restrictions and the presence of wild animals are likely to be a reflection of (i) this study including informal PUGS ranging from riparian zones to dense thickets, which many other studies do not, (ii) the study being done in low-income areas with limited budgets for upkeep of PUGS, and (iii) the study including the municipal commonages which are used for cultural activities and ceremonies at certain times of the year.

4.2. Attitudes and preferences towards specific elements of PUGS

This study revealed that there were elements that attracted users to the PUGS despite the significance of some deterrents being greater than the attractions, hence local residents not visiting PUGS generally, or the one closest to their homes specifically. The formal PUGS were the only ones with amenities like play equipment, fences and seating, which confirms results from earlier studies (e.g. Özgüler, 2011; Shackleton & Blair, 2013; Zhang et al., 2013). The presence of recreational elements within PUGS has been shown to increase the attractiveness of the space (Bertram & Rehdanz, 2015; Zhang et al., 2013). Moreover, the presence of recreational equipment within the formal PUGS provided the only place for children to play in a safe environment. According to the Victims of Crime Survey in South Africa, there is increasing fear of crime in PUGS resulting in parents discouraging their children from playing in public spaces (StatsSA, 2016). Despite this context, recreational elements within the formal PUGS underpinned feelings of happiness for many users. Özgüler (2011) reveals how formal parks are considered as safe spaces for taking children to play, which is good for their cognitive, emotional, psychological and physical growth and development (Thompson, Aspinall, & Montarzino et al., 2008; Soga & Gaston, 2016). Within the context of this study, it is therefore important for attention to be drawn to the safety elements and childrens' play equipment within the limited formal PUGS in the low-income areas (McConnachie & Shackleton, 2010).

Municipal commonage visitors generally enjoyed benefits like picking fruits and collecting firewood and medicinal plants. These findings about urban foraging corroborate previous studies (i.e. Cocks, Alexander, Mogano, & Vetter, 2016; Davenport et al., 2011; Garekae & Shackleton, 2020) that the urban residents in South Africa rely to some extent on the municipal commonages for natural resources for direct subsistence and cultural activities. Moreover, such collection is not restricted to commonage, but occurs wherever the required resources are located, and access is allowed (Garekae & Shackleton, 2020). Indeed, Kaoma and Shackleton (2015) showed that in the poorer urban neighbourhoods in South Africa, approximately 20% of annual household income (cash and non-cash) is obtained from collecting resources from a range of formal and informal PUGS. Such foraging in formal and informal PUGS is increasingly noted even in developed world contexts (Hurley, Halfacre, Levine, & Burke, 2008; McLain, Hurley, Emery, & Poe, 2014; Palliwoda et al., 2017).

The ability to engage in cultural practices in nature is a vital component of the lived reality for many Xhosa residents in the region (Cocks et al., 2021; Cocks & Dold, 2006). Our study confirms the importance of interaction with nature among local residents, and for most respondents the informal PUGS and municipal commonages are the only places which retain some vestiges of a natural environment close to them. This echoes Rupprecht, Byrne, Uede et al. (2015) who found that urban residents of Brisbane (Australia) and Sapporo (Japan) felt informal PUGS 'are real and not fake like parks'. The municipal commonages are considered as places that bring fulfilment and purpose for the residents. Moreover, the results also suggests that the municipal commonage holds a cultural value among men in specific seasons and remains irreplaceable in fulfilling cultural traditions. The municipal commonage also provides subsistence for elements ranging from medicinal plants, and animals to hunt and encompasses complexly interwoven meanings ingrained in Xhosa culture ranging from the functional

to the cultural. Despite the associations and meanings of nature within the municipal commonages to local residents, research in these areas is limited in urban greening literature, prompting calls to re-imagine what PUGS should comprise by interpreting peoples' experiences, attitudes and preferences (Cocks et al., 2021; Davenport, Shackleton, & Gambiza, 2012; Palliwoda et al., 2017).

For most respondents the negative elements (such as litter, lack of maintenance, livestock) were the first thing they noticed upon visiting PUGS, rather than the positives discussed above. Our study therefore confirms that lack of maintenance, the absence of desired infrastructure and roaming of livestock can result in negative attitudes and emotions concerning PUGS and hence willingness to use them, corroborating previous findings (Adegun, 2018; Adinolfi et al., 2014; Sanesi & Chiarello, 2006; Shackleton et al., 2015). For example, the feelings of displeasure, disgust and fear arose from the presence of high levels of litter, anti-social behaviour and livestock. The high levels of litter and neglect within many spaces was reported as a major deterrent to visiting PUGS for both users and non-users, as also found by Shackleton & Njwaxu (2021). This is consistent with Van Herzele & Wiedemann (2003) who point out that certain preconditions exist which influence the use of PUGS, and if not met can result in negative attitudes towards them (Adinolfi et al., 2014; O'Brien, 2006; Schroeder, Anderson, & Daniel, 1984). Thus, there is need for proactive planning and enhanced management in terms of providing recreational equipment, provision of litter bins, and better maintenance of the PUGS by the citizenry since in these study areas municipalities are already burdened by high budget constraints for maintaining PUGS (Gwenda & Shackleton, 2015; Shackleton & Njwaxu, 2021).

Allied findings point to the feelings of fear that come with the presence of livestock, specifically cattle, within the spaces which can be attributed to the destruction of vegetation by cattle, unsightly and smelly dung, and in some instances, physical threat of people by cattle (Richardson & Shackleton, 2014; Shackleton & Njwaxu, 2021). Besides, Louza (2007) found that the presence of stray animals annoyed athletes and scared children in PUGS, whilst the presence of livestock within PUGS is considered a 'bad image' in Khartoum, Sudan (Leenstra & Vellinga, 2010). Additionally, cattle frequently damage newly planted trees and flower beds (Richardson & Shackleton, 2014; Shackleton et al., 2018). Therefore, there is need for an effective livestock management plan, certainly for formal PUGS (Davenport et al., 2012).

In the same light as studies in the Global North (Irvine et al., 2010; Shanahan, Lin, Gaston, Bush, & Fuller, 2015), this study showed that there are varying attitudes in response to vegetation type, cover and maintenance. While Shanahan et al. (2015), in Brisbane, Australia, showed that people generally preferred to be in parks with trees, most respondents preferred to be in areas with low tree cover, mainly citing safety fears and feeling isolated. Our current study also shows conflicting views about the presence of vegetation within PUGS in the low-income areas, as others stated that they need nature for their well-being for subsistence, yet some expressed high levels of fear, sadness and anger. This clearly shows that the presence and maintenance of natural elements within PUGS influences people's attitudes towards such, echoing Adinolfi et al. (2014) and Adegun (2018). For example, Adegun (2018) found that the feelings of fear, sadness and anger were evoked when people were prompted on how they felt about the dense trees and shrubs in the PUGS next to their homes in the informal settlements of Kya Sand, Johannesburg. Thus, there is need to acknowledge that there is a diversity of emotions and feelings that urban residents will have about nature and PUGS, and that a one-size-fits all planning approach is insufficient. Moreover, previous work in South Africa (Chinyimba, 2012, Gwenda & Shackleton, 2015) reported that urban residents appreciate nature and trees but not if it is neglected, which departs from the usually well-kept vegetation within PUGS in the Global North.

Gender-differentiated use of PUGS has been previously reported (Dalu, Manyani, & Masunungure, 2020; Özgüler, 2011; Shackleton et al., 2015). The findings of this study indicate also that there was some

gender differentiation in the visitation rates and uses of PUGS, and hence emotions towards them or particular elements within them. For example, the use of municipal commonages was often cited pertaining to male cultural roles while women collected fruits and herbs and feelings of anxiety or fear of attack were higher amongst females than males. Several respondents noted that local authorities have not factored in gender sensitivity in green space planning and maintenance. Also, considering rezoning some of the informal PUGS to be formal PUGS which are usually better maintained and have more safety features is impossible in our context as the municipality already cannot provide sufficient management to the currently available formal PUGS. Some studies report higher incidences amongst women of fear of dense vegetated spaces (Shackleton et al., 2015; Zhang et al., 2013).

The findings of this work suggest that the design of the sampled PUGS does not conform to most residents' ideals and needs. Most respondents preferred formal PUGS which have a variety of recreational facilities (e.g. benches, swings and play equipment, barbecue stands), open layout with well-spaced trees, open lawns, clean and well maintained. However, some preferred more natural elements like trees, grass and birds within the PUGS. It was evident that the available PUGS had limited recreational facilities and lacked management, thus many local residents were not motivated to visit them. This is corroborated by Shackleton and Blair (2013) who pointed out that respondents in two towns in the Eastern Cape, South Africa, would prefer to visit PUGS other than their local one because of the better quality and availability of various recreational amenities (Shackleton & Njwaxu, 2021).

Although the majority of respondents valued and visited PUGS, many suggested that informal PUGS and municipal commonages should be for development of infrastructure and services like clinics, schools, libraries and community halls. In the case of South Africa, this can be attributed to the current shortage of housing within towns and cities and also the limited availability of public service facilities like clinics and schools (Charlton & Kihato, 2006; Moroke, 2009). Moreover, it also suggests that because informal PUGS and municipal commonages are not zoned as formal PUGS people see them as undeveloped land, on which developments could occur.

5. Conclusion

Previous literature in South Africa and globally has focussed on the use of and attitudes towards formal PUGS, with relatively little on informal PUGS and specific elements in PUGS. In considering both in this study we revealed that informal PUGS were the most visited type of green space. This is a function of inadequacy in the amount and maintenance of formal PUGS within these areas and the relative accessibility of informal PUGS being next to people's homes. Attitudes and preferences towards PUGS have been broadly studied, however, the attitudes towards specific elements of the PUGS is limited in the literature. In general, negative feelings towards PUGS can be noted as a direct consequence of the lack of maintenance (informal PUGS), unkempt nature of vegetation and lack of recreational facilities. However, the study suggests that if the PUGS are planned and maintained effectively in a way which caters to people's needs, then the presence of woody and non-woody plants is favoured. This indicates that the current design, management, and infrastructural components of the studied PUGS do not contribute optimally to the wellbeing and quality of life of local residents as much as they could. In addition, it is most important that the informal PUGS are adequately managed to maintain peoples' interests, support and enjoyment of these spaces considering that they were the most frequently visited green spaces. The results of this study brings to the fore that informal PUGS are effectively used, which calls for greater inclusion and enumeration of informal PUGS in statistics of the distribution and quantification of PUGS in urban forestry and greening studies. The ability and potential of informal PUGS to provide various roles for ecosystem functioning and people has been recently debated. Our results show that not all informal PUGS will contribute optimally to

peoples' enjoyment and wellbeing as a result of some of them having derelict elements or not being well managed. However, with limited budgets for urban greening in the context of high poverty and infrastructure backlogs, it is unlikely that municipal agencies can assume the responsibility for regular management of informal PUGS. Consequently, the potential for these spaces to be managed through community stewardship programs to enhance their maintenance and attraction and hence their contribution to residents' wellbeing needs to be explored. The current nature and management of the informal PUGS also presents an opportunity for new models or innovations into how these spaces can be effectively managed for the full enjoyment of their elements.

The roles of gender and age in influencing relationships between people and PUGS is an important issue which requires further research to be able to plan PUGS suitable for all. Decision-makers should consider the needs of different groups in local communities so that PUGS are managed in a way that meets the needs of the different users. A call is made to incorporate informal green spaces and municipal commonages in similar studies to generate a more holistic understanding of urban citizens' attitudes, needs, and use patterns.

Author statement

A.M, C.M and M.C conceived of the presented study focus. A.M was responsible for the conceptual formulation, data collection, data analysis and the write up. C.M and M.C were part of the preparation of the draft of the article and responding to reviewers comments. C.M and M.C provided supervision during A.M studies. M.C also provided financial support needed for the study through the National Research Foundation (NRF) of South Africa.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.landurbplan.2021.104147>.

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