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Planning and designing livable recreational open spaces in developing countries. Insights from Souk Ahras City, Algeria

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Abstract. *Creating livable recreational public open spaces is essential for urban quality of life and well-being. In the Algerian context, the topic of public open spaces has been extensively investigated. However, little research has examined how spatial and physical attributes of recreational open spaces influence their use and perceptions by residents. This study investigated the role of urban planning and urban design in shaping livable recreational open spaces in Souk Ahras City, Algeria. The study used a mixed-methods approach: spatial analysis was used to map five typologies, while a survey among 426 residents was used to assess the residents' satisfaction, use, and perception of recreational open spaces. Although several recreational spaces have been, their availability was insufficient. In addition, satisfaction levels with the spatial and physical attributes of recreational open spaces were mainly average to low. Moreover, satisfaction was positively correlated to use frequency, duration, and favorable perception, highlighting the importance of the design quality of those spaces. However, satisfaction did not predict activities undertaken, underscoring the need for considering more than just the physical aspect when new recreational open spaces are proposed. Recommendations include increasing provision and improving spatial and physical attributes. The findings provide empirical insight to guide context-specific interventions for improving developing cities' recreational open spaces. Further research should examine interactions between space, culture, and policy across multiple developing cities.*

Keywords. *landscape design, perception, recreational open spaces, residents' satisfaction, urban planning, use pattern.*

Abstrak. *Menciptakan ruang terbuka untuk sarana rekreasi publik yang layak huni sangat penting bagi kualitas hidup dan kesejahteraan perkotaan. Dalam konteks Aljazair, topik ruang terbuka publik telah diselidiki secara luas. Namun, hanya sedikit penelitian yang meneliti bagaimana atribut spasial dan fisik ruang terbuka rekreasi mempengaruhi penggunaan dan persepsi penghuninya. Studi ini menyelidiki peran perencanaan kota dan desain kota dalam membentuk ruang terbuka rekreasi yang layak huni di Kota Souk Ahras, Aljazair. Studi ini menggunakan pendekatan metode campuran: analisis spasial digunakan untuk memetakan lima tipologi, sedangkan survei terhadap 426 warga digunakan untuk menilai kepuasan, penggunaan, dan persepsi warga terhadap ruang terbuka rekreasi. Meskipun terdapat beberapa tempat rekreasi yang disediakan, namun ketersediaannya masih kurang. Selain itu, tingkat kepuasan terhadap atribut spasial dan fisik ruang terbuka rekreasi sebagian besar berada pada tingkat rata-rata hingga rendah. Selain itu, kepuasan berkorelasi positif dengan frekuensi penggunaan, durasi, dan persepsi positif, sehingga menyoroti pentingnya kualitas desain ruang tersebut. Namun, kepuasan tidak memprediksi aktivitas yang dilakukan, sehingga menggarisbawahi*

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perlunya mempertimbangkan lebih dari sekedar aspek fisik ketika ruang terbuka rekreasi baru diusulkan. Rekomendasinya mencakup peningkatan penyediaan dan perbaikan atribut spasial dan fisik. Temuan ini memberikan wawasan empiris untuk memandu intervensi sesuai konteks guna meningkatkan ruang terbuka rekreasi di kota-kota berkembang. Penelitian lebih lanjut harus mengkaji interaksi antara ruang, budaya, dan kebijakan di berbagai kota berkembang.

***Kata kunci**. desain lansekap, kepuasan penghuni, perencanaan kota, pola penggunaan, persepsi, ruang terbuka rekreasi.*

Introduction

Public open spaces that support recreation are vital components of cities, as they provide areas for activities that enhance quality of life and well-being for residents. These multifunctional recreational open spaces accommodate social, economic, political, cultural, and leisure pursuits (Hall and Page, 2006). According to Aram et al. (2019), the terms 'public open spaces' and 'recreational open spaces' are often used interchangeably. Effective planning and design of recreational open spaces facilitate their use and enhance their perception by residents (Bratina Jurkovič, 2014; Hadavi and Kaplan, 2016; Bendjedidi, Bada and Meziani, 2019; Kaghouche and Benkechkache, 2023). In this regard, architects, urban designers, and urban planners are responsible for shaping the physical aspects of public spaces in a way that promotes proper utilization and maximizes interaction with these spaces (Gehl and Svarre, 2013). Effectively, the use of urban open spaces that support recreational activities is conditioned by their spatial and urban attributes (Koohsari *et al.*, 2015).

In Algeria, public open spaces have evolved over time, reflecting the social changes, influences and challenges faced by the country throughout its history (Ladjal and Bensaid, 2012). Their characteristics are the expression of both indigenous cultural practices and external colonial influences. Historically, Algeria has been home to various civilizations, including the Berbers, Phoenicians, Romans, Arabs, and lately, the French (Lorcin, 2002; Marçais *et al.*, 2004; Brett, 2007; McDougall, 2017). Each of these civilizations has left its marks on the development of public open spaces. Traditional public open spaces in Algeria often include marketplaces known as *souks* (Souidi and Bestandji, 2019). They are vibrant spaces that serve as economic and social hubs (Abdelkader *et al.*, 2019). After the arrival of Islam, the concept of public open space evolved to accommodate the religious practices and community gatherings. Mosques and their surrounding courtyards became spaces that fostered social cohesion and spiritual activities (Ivashko and Kouider, 2019).

Under French colonial rule, public open spaces in Algeria were designed and used according to the preferences and needs of the colonizer (Osborne and Celik, 1999). The colonial urbanism created the square, or '*placette*', which was designed as a symbol of the French authority and to meet the recreational needs of the colonials (Stora B., 2001). These public spaces reflected the influence of French architecture and urban design. Promenades, formal gardens, tree-lined boulevards, and statues were incorporated into the urban fabric (Njoh, 2016). Examples of such spaces can be found in Algiers, Oran, Annaba, Souk Ahras, etc.

The historical and cultural evolution of pre-industrial cities including in Algeria, demonstrates the strong connection between public life and public open space, fostering a sense of community and belonging. Yet, since the beginning of the 1960s, environmental design pioneers such as Jane Jacobs and William H. Whyte, Christopher Alexander, and Jan Gehl have pointed out the declining quality of public spaces in newly built districts. They deplored the dissociation between public life and public space that characterized pre-industrial cities. Unfortunately, societies have

changed and the knowledge of shaping vibrant and functional public spaces has been lost in contemporary large-scale urban planning, including in Algeria (Bouadam and Chetbi, 2024).

While early open spaces reflected Algeria's rich cultural history, the national government has recently invested in creating new urban parks and neighborhood squares that provide recreational and social opportunities for the public. Examples include Dounia Park in Algiers, Jardin Citadin Méditerranéen in Oran (Kettaf F., 2013), Bardo Park in Constantine (Boumali, Tamine and Lalmi, 2022), and Ain Bouaroua Public Garden in Setif (Boudab, Diafat and Madani, 2023). These projects demonstrate the state's desire to ensure a high-quality living environment for the population. Nevertheless, these large-scale programs have been primarily focused on major cities. In addition, this experience has remained secondary to large-scale housing and economic development programs. Indeed, the Algerian state has prioritized addressing the housing shortage over the quality of open spaces, relegating them to a low priority in urban development plans (Ali Khodja A. and Lekehal A., 2017; Hafiane A., 1992; Guettiche G. and Baziz A., 2021). Moreover, the designs of public open spaces often fail to meet the social needs and aspirations of the population, leading to their underutilization and undervaluation. Lack of equipment and urban furniture, small park sizes, lack of greenery, among other factors (Chabi and Bouhadjar, 2016), constitute major concerns that hinder the use of those spaces (Boudab, Diafat and Madani, 2023).

The existing literature on public open spaces in Algeria can be categorized into four main groups, including but not limited to: studies on thermal comfort and urban microclimate (Boutellis and Bouchair, 2022; Labdaoui *et al.*, 2021; Boumaraf and Amireche, 2023); studies on acoustic perception of public open spaces (Bouzir, Zemmouri and Berkouk, 2018; Maffei *et al.*, 2021); studies on spatial and morphological characteristics of public open spaces using syntax analysis (Laouar, Mazouz and Teller, 2019; Bendjedidi, Bada and Meziani, 2018; Bendjedidi *et al.*, 2018; Bendjedidi, Bada and Meziani, 2019; Tedjari and Abbaoui, 2023); and studies on the utilization of and interaction with public open spaces in mass housing projects (Farida, 2013).

While research on Algerian public open spaces exists, a significant knowledge gap remains regarding the specific needs and preferences of local residents in the planning and design of these areas. There is a need for more research to understand how residents perceive and use public open spaces and what planning and design factors contribute to their satisfaction with these spaces. Thus, the main research questions emerged: *How are recreational open spaces shaped, and how are they used and perceived by local residents in Souk Ahras, Algeria?* This study aimed to address the literature gap by examining the current practices of shaping recreational open spaces in an Algerian city. The outcomes of this research could help to inform the development of policies and programs to improve the quality of public open spaces in Algeria.

Souk Ahras City was selected as an illustrative case study to depict the current state of recreational open spaces in Algeria. The city serves as an example of a rapidly growing city that has to face degradation of the urban environment and a decreasing quantity and quality of public open spaces (Hafsi and Chabi, 2022). Furthermore, it is observed that, despite the existence of formal recreational open spaces, local residents tend to engage in informal recreational activities within spaces not originally intended for such purposes. Particularly during summer nights, residents occupy agricultural lands at the city's entrance, vacant land in neighborhoods, open spaces near ice cream shops, and so forth. This situation motivated the current research to investigate the factors that contribute to creating livable recreational spaces from the residents' perspective **(Figure 1)**.

The next section of this paper presents the theoretical framework used, based on a literature review of the qualities of urban planning and design that make recreational open spaces livable and

enjoyable. The subsequent section outlines the methodological process for the research investigation, which included a site visit survey of the spatial and physical characteristics of recreational open spaces, and a questionnaire survey administered to a sample of the city's residents. Then, the findings of the physical survey and statistical analysis of the questionnaire are detailed to elicit public perceptions of recreational open spaces and how these perceptions influence their usage. Lastly, the paper draws tentative conclusions, presents reflections on policy and practice, outlines the study's limitations, and suggests directions for further research.

Figure 1. A view on a new neighborhood in the outskirts of Souk Ahras City. Due to the absence of recreational spaces, women use the sidewalk for passive recreational pursuits. (Source : Author, 2023)

Literature review

A growing body of literature has examined the issue of shaping livable and successful recreational open spaces. Recreational open spaces can be broadly defined as non built-up areas of cities designed to be open and equally accessible to all categories of the population (Carr *et al.*, 1992; Duncan *et al.*, 2013). Currently, recreational open spaces exhibit significant variations in form, urban context, and usage. The content of recreational open spaces is influenced by their location within the city structure and the nature of urban activities in surrounding areas (Mokras-Grabowska, 2018). Consequently, comprehending recreational open spaces involves assessing their spatial and physical attributes in relation to the usage patterns they sustain and their perception by local residents.

A framework for shaping livable and successful recreational open spaces in cities: an approach based on residents' satisfaction and uses

In the realm of shaping successful recreational open spaces, numerous studies, including Project for Public Spaces (PPS, 2016), have identified four key qualities that characterize successful urban spaces: accessibility; people's engagement in activities; comfort and good image; and sociability, i.e., places where people interact and bring visitors. According to UN-HABITAT (2015), high-quality public open spaces are characterized by adequate supply, equitable distribution, strong connectivity, and high accessibility. In addition, Giles-Corti *et al.* (2005) argue that numerous observable factors, particularly those directly related to urban planning, could influence the utilization of public open spaces. These factors include the quality and quantity of space, access to nearby competing facilities, the alignment between park attributes and local users' needs, park maintenance, and perceived safety.

This literature review unveiled a set of factors that are mainly associated with urban planning, landscape design, and amenities (facilities). Collectively, these factors are considered to be the

independent variable of the study. The study's dependent variable, denoted as the 'use pattern' and 'perceived quality' of recreational open spaces, is influenced by the independent variables. The dependent variable is influenced by the independent variable. Building upon these key points, the subsequent section of the literature review offers a more in-depth exploration of the study's variables.

Urban planning constitutes the foundational dimension in shaping successful recreational open spaces. Gehl (1971), in his book *Life Between Buildings*, emphasizes that planning decisions significantly influence the patterns of activities in open spaces, thereby affecting the liveliness of cities. Urban policies play a pivotal role in determining the quantity and location of recreational spaces within a city, ensuring free and equal access for all city dwellers (Carr *et al.*, 1992); (Berdoulay, Castro and Gomès, 2005).

Recreational open spaces, by nature, are freely accessible. Physical accessibility involves clear pedestrian linkage, connections to public transportation (Project for Public Space, 2000; Gehl 2002; CABE and DETR, 2001; Williams and Green, 2001), proximity to residents (C.C. Konijnendijk , T.B. Randrup, 2004; Giles-Corti *et al.*, 2005), and the absence of physical barriers affecting access, such as major roads (Corti *et al.*, 1996). In addition, visual accessibility is another critical factor for the success of public spaces. This implies that recreational open spaces are visible to people. Gehl (2011) found that many of the activities were conducted in space with low walls or corridors. This is because people have a sense of control over the space while avoiding conflict and surveillance from others.

Beyond planning considerations, design principles applied significantly influence the success of recreational open spaces. Recreational open spaces should be well-designed and adequately equipped with the necessary infrastructure to make them meaningful, attractive, comfortable, safe, and generate a positive perception among their users. Extensive empirical testing has highlighted several critical design factors, including the integration of amenities, the facilitation of positive social interactions, the management of a balance between vehicles, pedestrians, and other users, and the creation of comfortable spaces (Carmona and Wunderlich 2012; Carmona, 2019).

Additionally, the spatial layout, i.e. the arrangement of streets, buildings, and public spaces, is a determinant factor in creating attractive recreational open spaces. According to Jacobs (1961), people's behavior is easily affected by the arrangement of streets, buildings and public spaces in the area. In the study of *The Image of the City* by Lynch (1960), it is asserted that 'Paths' is one of five important elements in determining the distinctive features of urban spaces. Lynch suggests that planners give importance to roads and streets, as these are easily recognized and retained elements.

Furthermore, the legibility of urban structure can be enhanced through the implementation of various elements, including sculpture, pergolas, low walls, paved walking spaces, outdoor furniture, terrain stairs, green structure and beauty spots. A well-designed landscape gives a special character to a space (Southworth, 2014). Urban space furniture enhances the experience of users of the public space (Grabiec, Łacka and Wiza, 2022). Some of the urban space furniture serves multifunction uses such as sculptures and seats. This furniture is intended to encourage people to stop and stay in the public space (Whyte, 1980). Moreover, green structures, such as trees and vegetative materials, contribute to climatic comfort, improve air quality, and humanize the outdoor environment (Farinha-Marques *et al.*, 2011).

Whyte (1980), in his book *The Social Life of Small Urban Spaces*, describes the close connection between the qualities of city space and city activities, documenting how simple physical

modifications can result in a remarkably better use of city space. Carmona (2018) also emphasizes that public spaces not only have to be safe but should also be relaxing. This may be achieved by accommodating formal and informal seating arrangements, careful design with consideration of microclimate, providing places to sit on hot sunny days and shelter on windy rainy days. Similarly, Montgomery (1998) notes that successful urban places are those that offer an adequate physical setting. Meaningful public spaces should be designed with careful consideration of user needs, providing necessities such as shops, toilets, benches, shading elements, street signs, bicycle racks, and waste bins (Carmona *et al.*, 2008). Furthermore, public lighting can enhance security in public space and fulfil traffic requirements when there is no natural light (Welsh and Farrington, 2008).

Recreational open spaces are multi-functional areas for social interaction, economic exchange, and cultural expression among a wide diversity of people. Based on the literature, urban planning appears to be responsible for establishing and organizing these public spaces, while landscape design plays a crucial role in facilitating and encouraging their use. Furthermore, the provision of facilities and effective maintenance are important for maintaining their structural integrity and improving the perceived quality of these spaces. Synthesizing the literature, it becomes evident that the main spatial and physical attributes that influence the use of recreational open spaces in cities are: availability, accessibility, proximity, safety, comfort, aesthetics, facilities, and maintenance. These factors play a crucial role in shaping livable and successful recreational open spaces, impacting residents' satisfaction and the perceived quality and usability of those spaces.

Residents' satisfaction, use, and perceived quality as key indicators of successful open recreational spaces

A key indicator of the quality of life is the satisfaction level with the urban environment (Sirgy and Cornwell, 2002). Decision-makers, urban planners, architectural experts and other specialists are driven by the concept of a livable urban environment. While they have a significant role in shaping urban spaces and assessing built environments (Gjerde, 2011; Kashef, 2016), they may not fully understand people's preferences (Devlin and Nasar, 1989). The concept of urban livability emerged during the 1980s as theorists and city planners sought to describe and quantify the impact of political, social, environmental and economic factors on the quality of life in cities (Newton, 2012; Jones and Newsome, 2015). It is a place-based concept that combines several factors that contribute to the quality and well-being of residents in urban settlements (Giap, Thye and Aw, 2014).

The livability of recreational open spaces depends strongly on individuals' expectations, as they ultimately are the users. Yet, people's perspectives on the design, development, and management of open spaces are often ignored, and spaces are developed without considering the needs and preferences of the users (Carr *et al.*, 1992). In this context, individual perceptions and satisfaction emerge as pivotal factors in the successful design and management of urban parks as they influence destination choices, park utilization, and decision to return (Tsurumi and Managi, 2015). The assessment of users' perceptions of public spaces typically involves various criteria, including comfort, inclusiveness, diversity, vitality, image, and likeability (Zamanifard *et al.*, 2019).

Numerous researchers, including Whyte (1980), Wischemann and Cooper (1987), Lynch (1980), Gehl (1987), Mozingo (1989), Lofland (1998), have emphasized the importance of usable and livable urban public spaces that ensure proper and effective use by urban residents. Consequently, the quality of recreational open spaces depends firstly on their usability (Kallus, 2001). According

to Jacobs (1961), activity serves as a quality indicator of a good urban environment. Gehl and Gemzoe (1996) further emphasize that high-quality public open spaces encourage people to stay longer and engage in a wider range of activities. In contrast, unsuccessful public open spaces are underutilized (Carr *et al.*, 1992). Therefore, public spaces must provide reasons for people to come, stay, and engage in various activities; otherwise, they risk remaining empty and unused (PPS, 2016).

The research conceptual model presented in (**Figure 2**) is based on the knowledge acquired through the literature review. It provides a framework for evaluating the quality of recreational spaces from the resident's perception.

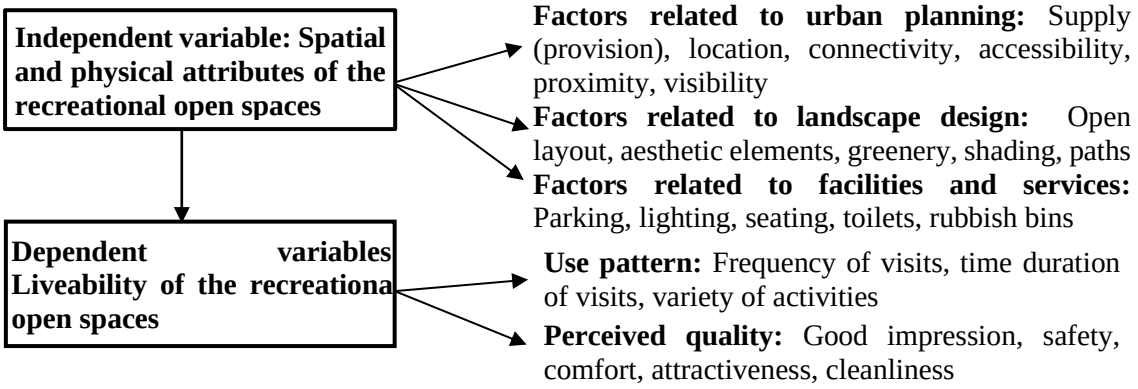

Figure 2. Research conceptual framework: assessment of recreational open spaces quality from residents' point of view. (Source: Author, 2023)

Research method

This section outlines the research approach, data collection, questionnaire design, and statistical analysis methodologies.

The study area

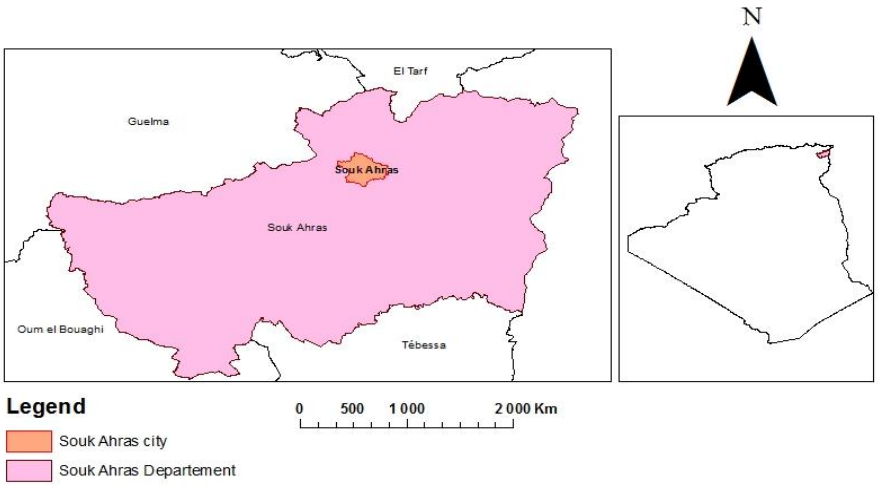

Figure 3. Location of Souk Ahras City, Algeria. (Source: Author, 2023)

The research was conducted in Souk Ahras, a city located in northeastern Algeria (Figure 3). In 2015, Souk Ahras had a population of 174,463 inhabitants. It covers an area of 20.4 km², with a

population density of 8,552 inhabitants per hectare. Notably, 98% of the population reside within the city (Department of Urbanism and Construction, 2008). Souk Ahras, established by French colonial authorities in 1843, experienced a fivefold population increase within half a century (Hafsi and Chabi, 2022).

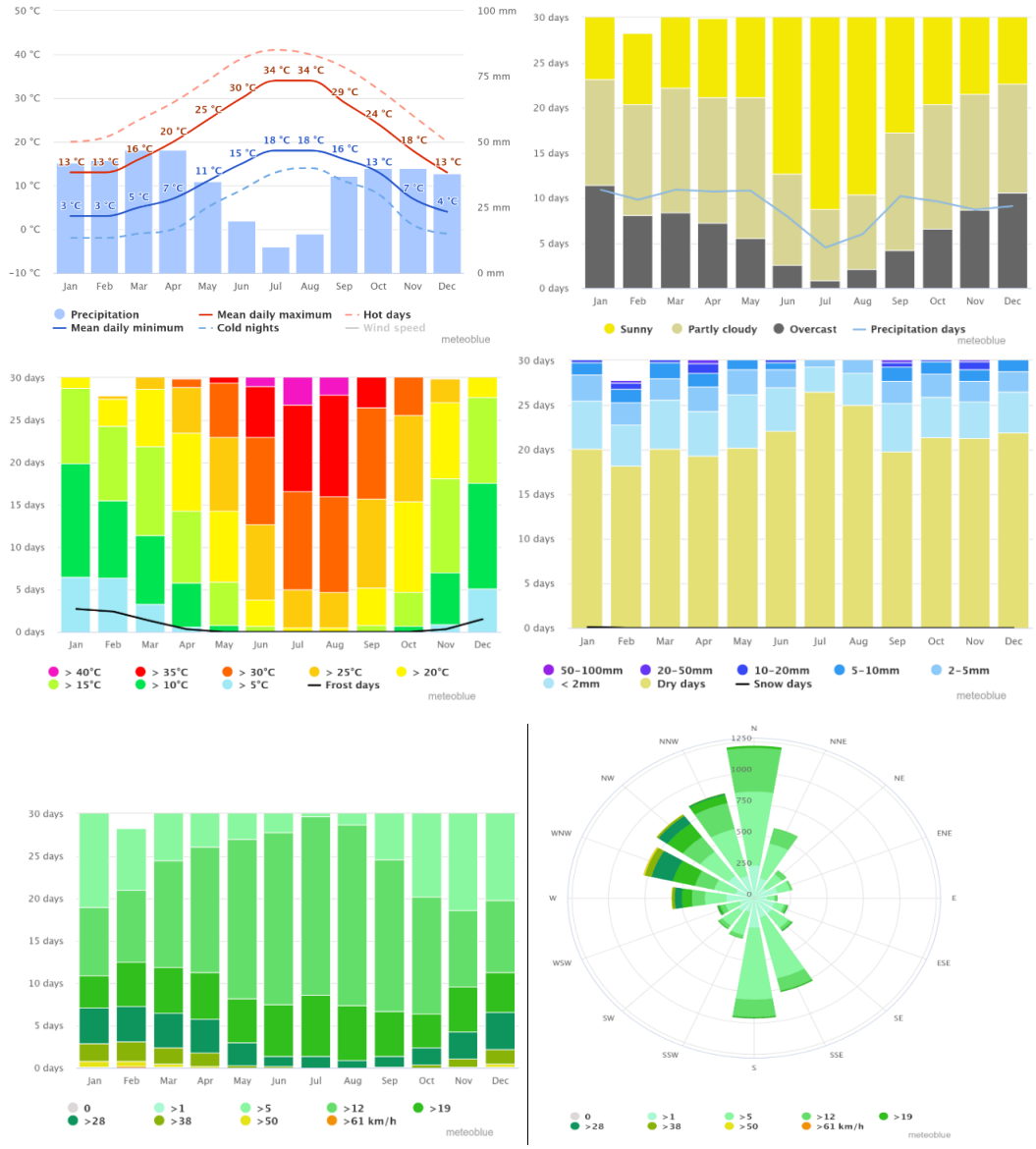

Figure 4. Climatic data of Souk Ahras City, Algeria. (Source: Simulated historical climate & weather data for Souk Ahras – Meteoblue, accessed on 22/02/2024)

Figure 4 shows the climatic data of Souk Ahras. Algeria has a hot-summer mediterranean climate (Köppen climate classification Csa) with warm summers and mild winters. The summers are short, hot, dry, and mostly clear, while the winters are long, cold, wet, and partly cloudy. The average annual precipitation amounts to about 602 mm (23.7 inches) and receives 103 rainy days on the 1 mm (0.04 inches). The hot season lasts for 2.9 months, from June 15 to September 10, with an average daily high temperature above 83 °F. The coldest temperatures usually occur in January, February, and December, when daily mean temperatures range from 7 to 9 °C (45-48 °F)

throughout the day. The precipitation chart shows that the wettest months are March, April, and October, with an average of 10 rainy days and 74 mm (2.9 inches) of precipitation per month. The driest months are June, July, and August, with an average of 21 mm (0.8 inches) of precipitation during these months (*Simulated historical climate & weather data for Souk Ahras – Meteoblue*, accessed on 22/02/2024) .

Research design

This study employed a comprehensive approach, integrating both spatial and quantitative methods, to investigate recreational open spaces. The research examined the typologies of these spaces and aimed to understand how local residents perceive and utilize them. Two core research questions guided this study: What are the primary typologies of recreational open spaces in Souk Ahras City, Algeria? How do local residents utilize them and assess their quality? Thus, the first research question aimed to elucidate the spatial aspects of the recreational open spaces (i.e., the dimensions, form, distribution, accessibility, design). For the second research question, a quantitative approach was employed to assess the residents' satisfaction with attributes of recreational open spaces and understand how those affect their perception and use patterns.

Within this study, we analyzed the different recreational spaces situated in the urban space of the city of Souk Ahras. While other informal recreational spaces exist in Souk Ahras, the current study focused exclusively on formally planned areas to assess the official planning and design approaches. Furthermore, the study aimed to examine city-wide recreational open spaces that serve a broader population. Consequently, the study excluded neighborhood recreational spaces primarily used by local residents. This decision allowed for a more focused analysis of urban-scale planning and design issues and ensured direct relevance to municipal-level policies.

Data collection

In this research, data were derived both from primary and secondary sources. The primary data were obtained through two methods: spatial survey and quantitative survey. The spatial survey involved collecting data on the spatial and physical characteristics of the existing recreational open spaces, such as their size, location, and amenities. This data was collected through site visits (conducted between May and September 2023), while photography served to document various aspects of these recreational open spaces. In addition, measurements were taken using high-resolution satellite imagery (Google Earth Pro) and GIS mapping. The quantitative survey involved collecting data on residents' perceptions of the recreational open spaces through a questionnaire survey. The combination of these methods allowed for a comprehensive dataset, providing a holistic view of the recreational open spaces and residents' perceptions. The secondary sources involved urban planning instruments such as the city master plan and the land use plans (Departement of Urbanism and Construction, 2008). In addition, the study used information provided by the official Facebook accounts of public institutions such as Wilaya, the Facebook accounts of public gardens, and the Facebook accounts of maintenance and cleaning companies.

Spatial survey

The spatial survey employed a site visit and mapping using GIS. This encompassed an analysis of the design, spatial arrangement, accessibility, landscape elements, and connection with the road network. Using ArcGIS 8, we mapped recreational open spaces to elucidate their spatial characteristics, including location, surface area, boundaries, form, integration within the urban

environment, on-site facilities, linkage with major roads and public transport network. Moreover, the data collected were used to cross-verify and corroborate information provided by the respondents.

Quantitative analysis

Survey design

Data collection utilized both online questionnaires distributed randomly in Facebook groups of city residents and paper questionnaires administrated by the author. The questionnaire distribution took place between May and July 2023. The target population comprised the urban residents of Souk Ahras City (i.e., 174,463 inhabitants), while the study population was defined by using Krejcie and Morgan's table (Krejcie and Morgan, 1970), i.e., 384 respondents. During the data collection, the participants' answers were anonymized and ensured to be used only for academic research. A total of 430 surveys were collected. After data cleansing and data validation, the valid number of surveys was 426.

To align with the research objectives, the questionnaire was designed to measure levels of residents' satisfaction with recreational open spaces and explore how satisfaction affects use patterns and perceptions. The questionnaire involved 32 items, selected based on the literature review. The initial number of items was 39, but some were removed after using Cronbach's alpha coefficient to ensure high internal consistency (**Table 1**). The scale showed sufficient reliability, with Cronbach's alpha = 0.70. Usually, a value of alpha above 0.70 indicates an acceptably reliable scale (Nunnally and Bernstein, 1994).

Table 1. Reliability of the measurement scale.

	Number of items	**Reliability (Cronbach's Alpha)**
Dimension 1: Satisfaction with spatial and physical attributes of recreational open spaces	18	0.876
Dimension 2: Use pattern and perceived quality of recreational open spaces	8	0.802
Measurement scale	26	0.701

Source: Author, 2023

The questionnaire consisted of 32 items grouped into 7 sections, which were further organized into 2 overarching dimensions:

Section 1 contained questions regarding the profile of the respondent (Table 3).

Dimension 1: Satisfaction with spatial and physical attributes of recreational open spaces (Table 4).

Section 2 included questions about supply characteristics and the urban environment attributes of recreational spaces.

Section 3 explored the characteristics of landscape design of recreational open spaces.

Section 4 contained questions about facilities and services provided within recreational open spaces.

Dimension 2: Use and perceived quality of recreational open spaces:

Section 5 described the usage patterns and activities performed in recreational open spaces (Figure 9 and Figure 11).

Section 6 included questions about the perception of recreational spaces (safety, comfort, overall image, attractiveness, cleanliness) (Table 6).

Measuring residents' satisfaction levels of recreational open spaces

According to Adriaanse (2007), empirical studies on residents' satisfaction can be categorized into two types. The first category treats residents' satisfaction as a predictive factor for their behavior, such as decisions to move to other areas. This approach is based on the relationship between individual needs or desires and the state of their surroundings. The second category uses resident satisfaction as an indicator to assess the quality of their space, surrounding environment, neighborhood, or the broader urban unit/district.

In this study, both approaches mentioned above were adopted. Firstly, residents' satisfaction was employed as a quality indicator for the design of public spaces. By evaluating the level of satisfaction among residents, insight can be gained into the effectiveness of designs and areas that may require improvement. This allows for a better understanding of how well the public spaces align with the needs and desires of the individuals who utilize them.

Secondly, residents' satisfaction was utilized to predict the use and perception of the recreational open spaces. The examination of the link between satisfaction levels and perceptions of residents, allow a deeper understanding regarding how satisfaction influences their use patterns and overall perception of these spaces. This information is important in making informed decisions regarding the development and management of public open spaces, as it provides insight into how to create environments that are not only visually appealing but also functional and enjoyable for users.

The satisfaction with spatial and physical attributes was assessed using 18 questions. Respondents were asked to rate their satisfaction on a five-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5). The overall satisfaction with spatial and physical attributes of recreational open spaces was calculated as the average satisfaction for the three sections, i.e., factors related to urban planning, factors related to landscape design, and factors related to facilities. In order to clearly present the results, we transformed the ordinal satisfaction data from a five-point scale to a three-point scale: 'low' = 1, 'average' = 2, and 'high' = 3. Mean scores were calculated for each survey item and cut-off points established based on the distribution of the means. This method of establishing discrete groups from continuous data is a well-documented approach (MacCallum *et al.*, 2002). The cut-off points used to define low, medium, and high satisfaction groups were partially based on the scale midpoints, a technique recommended when collapsing Likert response categories. A mean score between 1 and 2.59 = 'low', a mean score between 2.6 and 3.39 = 'average', and a mean score between 3.40 and 5 = 'high' (Santos A., 1999).

The perceived recreational space quality was measured with five-item questions. The participants were asked to evaluate the perceived quality, again using a five-point Likert scale, ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. Use pattern was appreciated with two-item questions: *How often do you visit recreational areas?* The suggested responses were ranked using a five-point scale ranging from 1 = 'never', 2 = 'sometimes', 3 = 'monthly', 4 = 'weekly', 5 = 'daily'. Then, the second item question sought to evaluate the time duration of the visit using a five-point scale varying from 0 = 0 mn, 1 = ≤30 mn, 2 = (>30 mn to ≤1 h), 3 = (>1h to ≤2h), 4 = >2h, 5 = variable (depending on circumstances). The reasons of visits intended as the types of activities performed was measured on a nominal scale, suggested responses included: 'relaxation', 'meeting others', 'accompanying children', 'celebrating events', 'appreciating the aesthetic values of the space', 'having no option for recreation', 'sport', 'curiosity', and 'work'.

Data Analysis

The themes presented in the questionnaires were analyzed using the Statistical Package for Social Scientists (IBM-SPSS 26). The resulting statistical data was employed to explore and evaluate residents' satisfaction with the spatial and physical aspects of recreational spaces, use patterns, and residents' perceptions. The statistical analysis involved a descriptive examination of frequencies and percentages. In addition, the study utilized Spearman's rho non-parametric test for correlational analysis. Spearman's rho was used to assess the strength and direction of the association between satisfaction levels with the spatial and physical attributes of recreational open spaces and use patterns (frequency and duration of visits), and between the satisfaction levels with the spatial and physical attributes and the perceived qualities of those spaces. Spearman's rho is appropriate for ordinal data and makes no assumptions about the distribution of the data (Hauke and Kossowski, 2011). Additionally, the study employed a one-way ANOVA test to assess the relationships between residents' satisfaction and the types of activities performed. One-way ANOVA was selected to allow for comparisons of means across the multiple activity groups and examination of statistically significant differences between them (Kim, 2014).

Findings: Characteristics and respondents' attitude regarding recreational open spaces in Souk Ahras City

This section presents the results obtained through data analysis. It serves as the empirical core of the research paper. This section thematically conveys the results from the spatial analysis, the survey questionnaire including descriptive statistics, the correlation test, and the one-way ANOVA test. Tables and charts are utilized to visually represent significant findings.

Spatial characteristics of the recreational open spaces in Souk Ahras City

Table 2. Characteristics of the recreational open spaces

	Recreational area no. 1	**Recreational area no. 2**	**Recreational area no. 3**	**Recreational area no. 4**	**Recreational area no. 5**
Type	Mini urban park (a significant proportion of built-up area)	Urban park (a significant proportion of green area)	Urban park (not finished, contains a few playing and services facilities)	Square (a significant proportion of built-up area)	Square (a significant proportion of built-up area)
Surface	2.6 ha	12 ha	9.1 ha	0.4 ha	0.16 ha
Context of creation	Reuse of urban void	Reuse of urban void	New urban development	Reuse of urban void	Renovation of an old French square

Source: Author, 2023

The availability of accessible and attractive open recreational spaces is an integral part of urban quality of life. As shown in Table 2 and Figure 5, the existing allocation of recreational open spaces in Souk Ahras City presents different typologies and different contexts of realization (Figure 6, Figure 9 and Figure 11). They are exclusively owned and managed by the local government, are scattered in the urban fabric inside a municipal territory, and do not form a clear network. This fragmented landscape is the result of the local urbanization processes (Hammache, 2020) in which a part of the remaining open space was developed to satisfy the demand of residents for recreation. These spaces are designed to provide outdoor recreation and contact with nature. Urban parks are also used for recreational purposes and for a variety of cultural events (Figure 8). Since 2019, the department of Souk Ahras City doted it with a set of recreational open spaces as part of the program of improving the urban environment of the city. However, the use

of recreational open spaces was restricted because of the lockdown imposed by the Covid-19 pandemic, therefore, the effective use of the recreational open spaces occurred only after the pandemic.

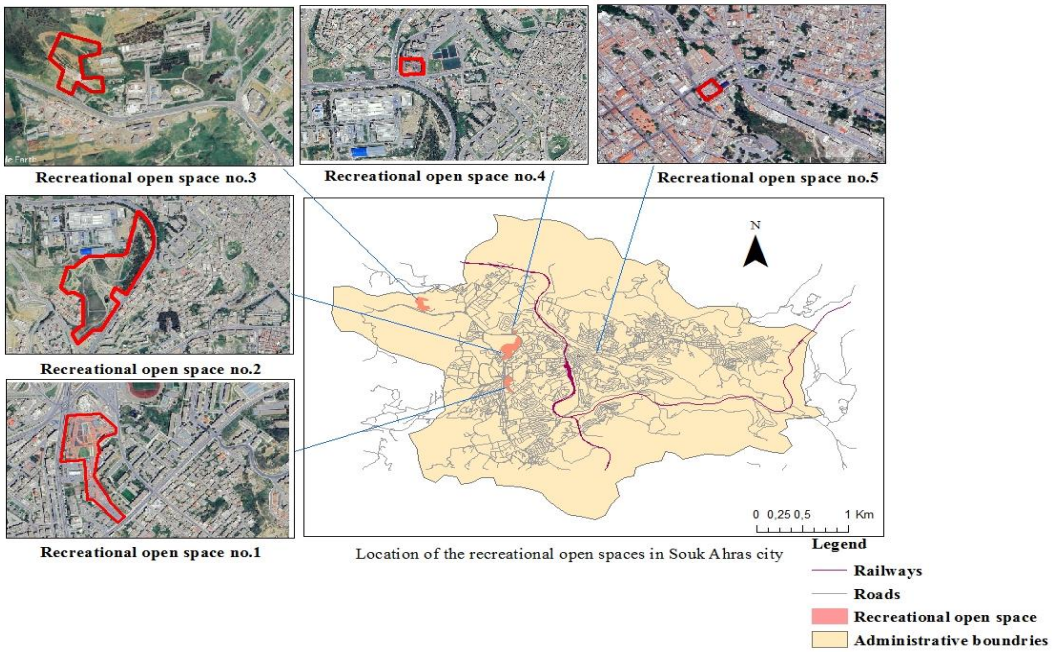

Figure 5. Location of the recreational areas in Souk Ahras City. They have multiple forms and are scattered within the urban fabric. (Source: Author, 2023)

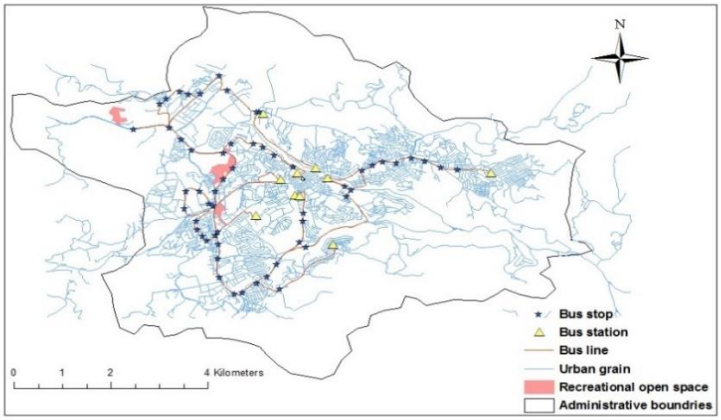

Figure 6. Recreational open spaces are connected to major roads and the public transport network. (Source: Author, 2023)

Recreational open spaces are distributed throughout the city and their proximity to high-traffic-density roads can present challenges in terms of safety and accessibility (Figure 6). In some instances, traffic congestion impedes the smooth flow of visitors, influencing their overall experience. Additionally, areas near national roads may pose safety concerns due to difficult access points (Figure 10) The presence of visible accessibility and parking facilities can significantly enhance the overall appeal of these recreational open spaces (Figure 10 on the left). Moreover, establishing strong connections with public transportation options can further improve the accessibility and usage patterns of these areas (Figure 6).

Figure 7. Recreational open space no. 5 (right) is a renovation of an old French public garden (left). (Source: Old postal cards of the French public garden (right), author, 2023 (left))

Figure 8. View of Zougheri public garden (Recreational open space no. 1). From left to right: 1) national independence festival on the 5th of July; 2) exposition and awareness campaigns; 3) sports competition. (Source: https://www.facebook.com/souk.ahras.jardin accessed on 04/08/2023)

Figure 9. Recreational open space no. 2: natural area, waterbodies, play settings and alleys. (Source: https://www.facebook.com/parccitadin41, accessed on 04/08/2023)

Figure 10. Recreational open spaces are surrounded by high-traffic-density roads: traffic congestion (Recreational open space no. 1), dangerous access from a national road posing a threat to visitor safety (Recreational open space no. 4). Visible accessibility and parking (Recreational open space no. 2). (Source: Author, 2023)

Social and demographic characteristics

Table 3 presents the social and demographic characteristics of the survey respondents. The percentage of female respondents (71.6%) was higher than the percentage of male ones (28.4%). Most respondents were within the age range of 24-40 years (54%), followed by 18-24 (30%), 40-60 (13.8%), and under 18 years (1.4%), respondents older than 60 constituted 0.7% of the total number of respondents. In terms of educational qualification, most of the respondents had a graduate degree (90.4%) or had completed high school (7.5%), and the smallest percentage (2.1%) of respondents had completed middle school. As for marital situation, the percentage of single respondents (58.7%) was the largest, while 39.7% of respondents were married, followed by divorced respondents who represented (1.2%), and the smallest percentage was that of widowed respondents (0.5%). Almost half of the respondents were employed (43%), followed by those who were unemployed (41.3%), followed by respondents who were self-employed (14.3%), and lastly those who were retired (1.4%).

Table 3. Respondents' social and demographic characteristics.

Item		**Frequence**	**Percentage (%)**
Gender	Male	121	28.4
	Female	305	71.6
Age	≤18	6	1.4
	>18 ≤24	128	30
	>24 ≤40	230	54
	>40 ≤60	59	13.8
	>60	3	0.7
Educational qualification	Middle school	9	21
	Highschool	32	7.5
	University	385	90.4
Marital situation	Single	250	58.7
	Married	169	39.7
	Divorced	5	1.2
	Widowed	2	0.5
Occupation	Unemployed	176	41.3
	Employed	183	43
	Self-employed	61	14.3
	Retired	6	1.4
Total		426	100

Source: Author, 2023

The social and demographic characteristics of the respondents provide insight into the needs and preferences of residents concerning the recreational open spaces. The majority of respondents were female, between the age of 24 and 40, and had a graduate degree. This suggests that the recreational open spaces may be particularly important to women, young adults, and people with higher levels of education.

Satisfaction level of spatial and physical attributes:

Table 4 shows the standard deviation and mean satisfaction scores of the respondents regarding the spatial and physical attributes of recreational open spaces. Across sections, respondents expressed the highest satisfaction with the factors related to urban planning, scoring 3.1, followed by the factors related to landscape design with a score of 2.79. The factors related to facilities and services received the lowest score of 2.55.

Table 4. Mean scores of satisfaction and standard deviation for different items and dimensions of the scale.

Question number	Sub-dimension	Strongly disagree	disagree	neutral	agree	Strongly agree	Mean	Standard deviation
	Satisfaction with spatial and physical attributes						2.81	0.64
	Factors related to urban planning: characteristics of the urban environment						3.1	0.64
01	Amount of recreational space is sufficient	194	173	22	29	8	1.79	0.95
02	Location of recreational areas is appropriate	52	120	102	122	30	2.9	1.15
03	Good connection between the space and its surroundings	49	123	126	111	17	2.82	1.06
04	Access to the recreational areas and related issues are clear	20	69	65	228	44	3.49	1.03
05	Easy access by walking	24	50	43	252	57	3.63	1.03
06	Proximity of recreational areas to a variety of transportation options	9	12	27	287	91	4.03	0.76
07	Recreational areas are clearly visible from a distance	42	96	65	189	34	3.18	1.16
08	Recreational areas interiors are visible from the outside	35	135	62	169	25	3.3	1.13
	Factors related to landscape design						2.79	0.87
09	Open layout design is captivating	58	142	76	123	27	2.81	1.17
10	Water fountains/ sculptures/statues are attractive	34	117	80	195	36	3.11	1.13
11	Landscape elements are appealing	53	161	74	110	28	2.76	1.15
12	Shading elements are sufficient	148	185	36	34	23	2.06	1.11
13	Presence of roads and paths that take people where they want to go	34	92	77	187	36	3.23	1.12
	Factors related to facilities and services						2.55	0.76
14	Parking: places for parking are sufficient	101	177	47	87	14	2.38	1.14
15	Lightning is sufficient	31	79	95	195	26	3.25	1.05

Question number	Sub-dimension	Strongly disagree	disagree	neutral	agree	Strongly agree	Mean	Standard deviation
16	Places to sit (chairs and benches) are sufficient	120	201	44	51	10	2.13	1.03
17	Public toilets in recreational areas are sufficient	145	144	66	60	11	2.17	1.12
18	Rubbish bins are sufficient	66	118	80	150	12	2.82	1.15

Source: Author, 2023

Concerning the factors related to urban planning, the respondents were most satisfied with the proximity of recreational open spaces to various transportation options, earning a mean score of 4.03. Conversely, respondents expressed dissatisfaction with the amount of recreational open spaces in the city, reflected in a mean score of 1.79, with 86.15% of respondents indicating dissatisfaction.

When assessing satisfaction with the overall spatial and physical attributes of the recreational open spaces, 19.01% of respondents reported a low satisfaction level with the characteristics of the factors related to urban planning, while 50% reported an average satisfaction level. Only 30.99% indicated a high satisfaction level. For the landscape design factors, 42.25%, 29.81% and 27.93% of respondents reported low, average, and high satisfaction levels, respectively. Additionally, for the facilities and services factors, 48.36%, 36.38%, and 15.26% expressed low, average, and high satisfaction levels, respectively. In summary, the statistical analysis indicated that 17.61% of respondents expressed a high degree of satisfaction regarding the spatial and physical aspects of the recreational open spaces, while 45.77% reported an average satisfaction level, and 36.62% reported a low satisfaction level (Table 5).

The satisfaction levels of spatial and physical attributes of the recreational open spaces reflect the needs and preferences of residents. Respondents were most satisfied with the proximity of recreational open spaces to various transportation options but least satisfied with the amount of the recreational open spaces. Overall, respondents were more satisfied with the urban environment and landscape design than with the amenities and services.

Table 5. Percentages of residents with different levels of satisfaction with spatial and physical attributes of the recreational open spaces.

	High satisfaction level	Average satisfaction level	Low satisfaction level
Factors related to urban planning	30.99%	50%	19.01%
Factors related to landscape design	27.93%	29.81%	42.25%
Factors related to facilities and services	15.26%	36.38%	48.36%
Factors related to spatial and physical attributes	17.61%	45.77%	36.62%

Source: Author, 2023

Use pattern and perceived quality of recreational open spaces

The second section of the survey aimed to determine the use pattern and perceptions of the recreational open spaces, specifically focusing on the frequency of visits by the respondents and duration of their stay. The majority of respondents (72.77%) indicated visiting the recreational open spaces 'sometimes', while the lowest percentage (0.94%) represented those who visited on a daily basis. Additionally, 5.40% of respondents visited them monthly, 6.81% visited weekly, and 14.08% never visited the recreational open spaces. Concerning the duration of their visits, the highest percentage of respondents (31.69%) stayed between 30 minutes and 1 hour, followed by 30.52% staying between 1 and 2 hours. A percentage of 16.67% stayed in the recreational open spaces for less than 30 minutes, while 9.62% stayed for more than 2 hours. Furthermore, 8.92% of respondents stayed for 0 minutes, and 2.58% visited for a variable duration based on circumstances.

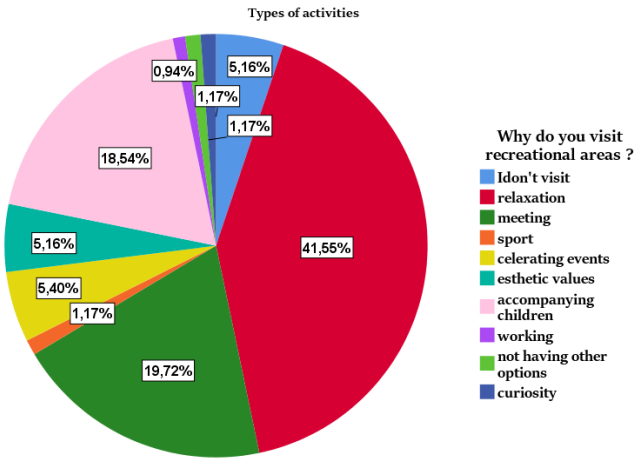

Figure 11. Reasons for visiting the recreational open spaces (types of activities). **(**Source: Author, 2023)

When asked about the reasons for visiting recreational open spaces, the participants provided a variety of purposes. The primary reasons for visits were relaxation (41.5%), meeting others (19.7%), and accompanying children (18.5%). Additionally, respondents visited recreational open spaces for celebrating events (5.4%), appreciating the aesthetic values of the recreational area (5.2%), while some (5.2%) mentioned that they never visited recreational open spaces. Furthermore, respondents who visited the recreational areas for sport, curiosity or lack of alternative options constituted the same percentage (1.2%). Finally, 0.9% of respondents visited the mentioned spaces to work (Figure).

Table 6 presents the mean score and standard deviation of the perceived quality of the recreational open spaces. The lowest score (2.77) corresponds to the 'good first impression', followed by the score for the perceived comfort of the recreational areas (2.80). Next is the score related to the perceived safety (2.89), followed by a score of 3.00 attributed to the perceived cleanliness. The majority of respondents visited recreational open spaces 'sometimes'. This suggests that recreational open spaces are not a daily destination for most people, but they are still used on a regular basis. Furthermore, the most common duration of visits is between 30 minutes and 1 hour. This suggests that residents are using recreational open spaces for short breaks or activities. In addition, the primary reason for visiting recreational open spaces were relaxation, meeting others, and accompanying children. This suggest that the recreational open spaces are valued for social and recreational benefits.

Table 6. Mean score and standard deviation of perceived quality of the recreational open spaces.

Question number	Item	Strongly disagree	disagree	neutral	agree	Strongly agree	Mean	Standard deviation
	Perceived quality of the recreational open spaces						2.82	0.85
01	Recreational areas of Souk Ahras City give a good first impression	56	122	127	108	13	2.77	1.06
02	Recreational areas of Souk Ahras City feel safe	52	108	117	134	15	2.89	1.09
03	Recreational areas of Souk Ahras City are comfortable	43	127	137	110	9	2.80	1.00
04	Overall visual image is attractive	55	142	122	96	11	3.69	1.04
05	Recreational areas of Souk Ahras City are clean	53	84	115	158	16	3.00	1.10

Source: Author, 2023

Concerning the perceived quality of recreational open spaces, 'good first impression' had the lowest score. This suggests that improvements in the design and maintenance of recreational open spaces are required to enhance their welcoming and inviting character. Oppositely, the 'perceived cleanliness' gained the highest score among respondents. This suggests that residents appreciate the cleanliness of recreational open spaces.

Correlation between residents' satisfaction with the spatial and physical attributes of the recreational open spaces and their perception and use pattern

Table 7 shows the correlation between satisfaction with spatial and physical attributes of recreational open spaces and the frequency of visits, duration of visits, and perception of the areas using Spearman's rho coefficient. The correlation analysis found positive and significant correlations between satisfaction with recreational open space attributes and both visit frequency and duration as well as perception. Specifically, satisfaction showed a strong positive correlation with perception (rho = 0.686, $p < 0.01$), a moderate positive correlation with visit frequency (rho = 0.310, $p < 0.01$), and a small positive correlation with visit duration (rho = 0.240, $p < 0.05$). The significant positive correlations indicate that higher satisfaction levels with recreational open spaces' attributes are associated with residents visiting more often, staying longer, and having an enhanced perception of the recreational areas.

Table 7. Correlation between spatial and physical attributes of recreational areas and frequency of visits, time duration of visits and perception of these spaces.

Independent variable	Dependent variables	Spearman's rho	*P* value	N
Satisfaction with recreational open space attributes	Frequency of visits	0.310	.000	426
Satisfaction with recreational open space attributes	Time duration of visits	0.240	.000	426
Satisfaction with recreational open space attributes	Perception of recreational open spaces	0.686	.000	426

Source: Author, 2023

The characteristics of recreational open spaces determine the ways they are used and perceived by residents. This study revealed that respondents who are more satisfied with the spatial and

physical attributes of recreational open spaces are more likely to visit them more often, stay longer, and have an enhanced perception of them. This underscores the significant impact of the planning and design on how residents use and enjoy them. In addition, the strong correlation between satisfaction and perception suggests that residents' overall perception of the recreational open spaces is heavily influenced by their spatial and physical attributes. Furthermore, a moderate correlation between satisfaction and visit frequency suggests the existence of other factors influencing visit frequency. In addition, a small correlation between satisfaction and visit duration suggests that satisfaction is not a major factor when determining the duration of visit and that other parameters should be considered.

Association between satisfaction with spatial and physical attributes and use pattern (frequency, duration of visit, and the type of activity performed) and perception (one-way ANOVA)

The following ANOVA results demonstrate the relationship between satisfaction with spatial and physical attributes of recreational open spaces and visit frequency, visit duration, and perception (Table 8). The ANOVA results provide further support for the correlation test in Section 4.5. The correlation test results showed that there was a positive correlation between satisfaction with spatial and physical attributes of recreational open spaces and both visit frequency, visit duration and perception. However, the ANOVA results also showed that satisfaction with spatial and physical attributes of the recreational open spaces did not have a significant impact on the choice of activities performed in recreational open spaces. This result suggests that other factors are more likely to influence the choice of activities.

Table 8. ANOVA parameters for each dependent variable.

Variable	Sum of Squares	Degrees of Freedom	Mean Squares	F-Value	p-Value	Conclusion
Frequency of visits	152,065	229.196	0.664, 0.410	1.619	0.000	Significant
Duration of visits	372,955	229.196	1.629, 1.125	1.448	0.004	Significant
Respondents' perception of recreational areas	253,037	229.196	1.105, 0.289	3.821	0.000	Significant
Reason for visits (types of activities)	1189,025	229.196	5.192, 4.862	1.068	0.318	Not Significant

Source : Author, 2023

Discussion

This study provides several key contributions to the understanding of recreational open spaces in Algerian cities, specifically in Souk Ahras City. It offers the first comprehensive analysis of these spaces in this context, filling a crucial gap in the literature. The study explored three main issues: the spatial characteristics of recreational open spaces in Souk Ahras City, the satisfaction levels with urban and physical attributes, and the impact of satisfaction on use patterns and perception.

The outcomes highlight the importance of shaping livable recreational open spaces. Thus, three main findings can be drawn from this study: firstly, the recreational open spaces in Souk Ahras City are accessible, managed by the local government, and serve as open areas for recreation. However, they lack a coherent network and have diverse typologies. Secondly, the respondents showed varying satisfaction levels with the urban and physical attributes, with the highest satisfaction with the factors related to urban planning, and the lowest related to facilities and

service. Proximity to transportation options received high satisfaction, while dissatisfaction was noted with the quantity of recreational spaces. Thirdly, higher satisfaction with the spatial and physical attributes positively correlated with increased visit frequency, longer visit durations, and improved perception of recreational areas. While satisfaction significantly influenced visit frequency, visit duration and perception, it had no significant impact on the choice of activities within these spaces.

Diversity of the recreational open spaces and their insertion in the urban fabric

This study fills the literature gap concerning specific typologies of recreational open spaces that reflect a specific approach of making a city's public open spaces. The findings enrich the literature on recreational open spaces by showing the variety of purposes they serve and the different user groups they accommodate. In fact, the spatial analysis revealed a diverse range of recreational open space typologies in Souk Ahras City, including urban parks, squares, and renovated areas. This diversity reflects the varied lifestyles, preferences, and needs of urban residents, aligning with the idea that public space design can cater to different pursuits (Carmona, 2019). These spaces offer various experiences and host a range of activities, such as children's play and relaxation. Recognizing this diversity is essential for urban planners to avoid imposing one-size-fits-all aspirations on public space projects, promoting inclusiveness, and reducing social exclusion.

A shortage of recreational open spaces in Souk Ahras City

This research provides important quantitative data on space allocation in Souk Ahras City, revealing a ratio of 1.3 m^2 per capita. This figure is significantly below the international standards that recommend 7 to 12 m^2 of public open space per person (World Health Organization (WHO), 2023). Similar lower space-per-capita ratios can be observed in other cities; for example, Bangkok (Thailand) has a mean park area of 1.8 m^2 (Thaiutsa *et al.*, 2008), and Ahmedabad counts 1.3 m^2 open space per capita (Faust *et al.*, 2020).

Consequently, it is the responsibility of local authorities to ensure sufficient open space to residents. However, it appears that this mission is not being adequately fulfilled. The rapid urbanization of cities is often accompanied by a low proportion of public spaces. Souk Ahras City, like many others, particularly in Southern regions, falls short of these targets. As suggested by UN-Habitat (2015), there is a need to address the challenge of rapid urbanization by allocating sufficient land to the development of public open spaces. This observation aligns with the existing literature highlighting the lack of adequate open space provision in rapidly urbanizing cities of the developing world (Güneralp et al., 2020; Kabisch et al., 2016). The findings provide new data on the specific situation of Souk Ahras City, which can be used inform urban planning decisions.

Satisfaction level of spatial and physical attributes

The findings showed a relatively low level of satisfaction with spatial and physical attributes of recreational open spaces in Souk Ahras City, with only 17.61% of respondents expressing a high degree of satisfaction. The study extends the literature on the recreational open spaces by providing new data on the specific factors that may affect the satisfaction of residents with these spaces. The analysis of the integration and distribution of recreational open spaces within the city reflects a democratic perspective. These spaces contribute to creating a sense of openness in a dense urban environment and facilitate accessibility with the presence of public transportation stations and services. Proximity to recreational open spaces is crucial, as their use is highly

influenced by distance. The perceived physical accessibility, proximity to public transportation stations, and visible accessibility are relatively good. However, dissatisfaction with the location of recreational spaces may be attributed to the type of linkage with the surrounding environment, often impeded by significant traffic roads. Insights from Aga (2010) underscore the importance of organizing public open spaces within the urban fabric and connecting them effectively, emphasizing visual communication as a key factor in creating aesthetically memorable public open spaces.

In terms of landscape design, while features like fountains and paths enhance the visual appeal, the respondents pointed out deficiencies in landscape elements, shade, and amenities like seating, trash bins, and toilets. Additionally, respondents reported a shortage of parking places, attributed mainly to scarcity of land in the urban fabric, hindering the visitation of these spaces. Considering that recreational open spaces are planned as part of the regeneration process of vacant land, creating parking is only possible if space for this purpose is available; otherwise, it becomes impossible (Figure 12) However, the current haphazard approach reflects the absence of a clear strategy. Effectively, the planning of recreational open space in Algerian cities has been a fragmented process lacking consistent goals and motivation. This necessitates a re-evaluation of the processes of planning recreational open spaces in cities, ensuring the provision of all necessary amenities. These findings can be used to inform the planning and design of future recreational open spaces in the city.

Figure 12. A parking lot with 400 places annexed lately to Recreational area no. 1. (Source: author, 2023)

Impact of satisfaction with spatial and physical attributes of recreational open spaces on use and perceived quality

This study contributes to the existing body of research by revealing positive correlations between satisfaction with the spatial and physical attributes of recreational open spaces and increased use and favorable perception of these spaces by residents in Souk Ahras City. These findings align with prior research conducted in diverse urban contexts. Sugiyama *et al.* (2015) found that walking to a public open space was associated with the presence of various attributes such as gardens, grassed areas, walking paths, water features, wildlife, amenities, dog-related facilities, and off-leash areas for dogs. (Fermino *et al.*, 2013) found that factors such as interesting objects, heavy traffic, positive attributes, and the presence of trees were associated with increased use of public open spaces. Chen *et al.* (2016) conducted a study focusing on the spatial characteristics of open spaces and their influence on public use. Their research highlighted the importance of factors such as the provision and distribution of facilities, careful space division, diverse and attractive edges, moderate vegetation coverage, and the presence of shade in determining the use of public open spaces.

Moreover, the strong correlation between satisfaction and positive perception of recreational areas is also supported by previous evidence. Mehta (2014), Zamanifard *et al.* (2019), and Mehta and Bosson (2021) emphasized the significance of comfort, safety, pleasurability, and other perceptual indicators in shaping positive user experiences in public spaces. The present study affirms this link, as higher satisfaction levels were associated with more favorable perception of safety, comfort, attractiveness, and other perceptual indicators. Van Dinter *et al.* (2022) study showed that the appreciation of facilities and the absence of disturbances positively influence the use and sense of place of a park.

In addition, Anastasiou and Manika (2020) found that residents' satisfaction with urban open space is influenced by several factors, among which the quality of leisure facilities and the suitability of infrastructure for specific categories of users (children). Moreover, it is acknowledged that the diversity and the quality of facilities in open space may increase visits (Kaczynski, 2010). Also, a good quality of facilities may attract more visits to the open space (Chen, Liu and Liu, 2016).

However, contrasting Gehl (1996) and other seminal scholars Appleyard (1980, 1987), Whyte (1980), Hillier (1984), Poole (1995), Huang (2006), the spatial and urban attributes of recreational open spaces did not predict activity patterns in Souk Ahras City's recreational open spaces. The present study does not align with the findings of Marušić (2011), who suggested that common patterns of behavior appear to be correlated with particular layouts and details in urban squares and parks. Moreover, the present study contrasts with Zhang and Lawson (2009), who demonstrated that the design of outdoor spaces significantly impacts social activities. As Salama and Azzali (2015) argued, future public spaces must move beyond physical attributes to more meaningfully address residents' needs and activation.

Conclusion

The quality of recreational open spaces in Souk Ahras City was discussed from two main perspectives: the spatial and the social perspective. This study effectively addressed the following research questions: How are recreational open spaces shaped, and how are they used and perceived by local residents in Souk Ahras City, Algeria? The research aimed to fill a knowledge gap regarding two key aspects: the current practices of planning and designing recreational open spaces in Souk Ahras City, and the specific needs and preferences of the city's residents regarding those areas. To answer these questions, the study employed a mixed-methods approach, combining spatial analysis of recreational open spaces in Souk Ahras City with a comprehensive questionnaire survey of local residents. The spatial analysis aimed to examine the physical characteristics, location patterns, and urban context of recreational open spaces. On the other hand, the questionnaire survey collected data on the respondents' social and demographic characteristics, satisfaction with spatial and physical attributes, usage patterns, and perceptions of recreational open spaces. In addition, various statistical analyses, including descriptive statistics, correlation tests, and one-way ANOVA, were conducted to examine relationships between variables.

The study uncovered a critical shortage in the provision of adequate recreational open spaces in Souk Ahras City, with only 1.3 m^2 per capita, significantly below international standards. This finding contributes new quantitative evidence to the broader discourse on public open space allocation in cities of the developing world. It underscores a systemic challenge faced by local authorities in fulfilling their responsibility to ensure sufficient open spaces for residents. In this context, urban planning policies should mandate minimum standards for recreational open space

provision, aligning with international benchmarks where feasible, or establishing context-appropriate targets.

In addition, this study showed that the creation of recreational open spaces in Souk Ahras City is characterized by significant fragmentation. This fragmented landscape of recreational open spaces is a direct result of a piecemeal urbanization process, reflecting the city's rapid and often unplanned growth. These spaces are scattered throughout the urban fabric, creating a disjoint network of public spaces. This finding highlights the lack of comprehensive, long-term strategic planning for recreational open spaces. As a result, the absence of an overarching vision hinders the creation of a cohesive, interconnected network of public spaces. The finding emphasizes the critical importance of thoughtful, holistic urban planning and design.

Furthermore, the respondents expressed moderate satisfaction with the urban planning aspects of the recreational open spaces but lower satisfaction with the landscape design and facilities and services s. Only, 17.61% of respondents reported high overall satisfaction with the spatial and physical attributes. These findings underscore a critical need for comprehensive improvements in landscape design and facilities. This could involve upgrading facilities, improving landscape design, and ensuring proper maintenance. For that, local authorities should prioritize a user-centered redesign strategy, potentially incorporating more green elements, enhancing aesthetic appeal, and upgrading facilities to better meet community expectations.

In addition, the study uncovered the usage patterns of recreational open spaces, the majority of respondents visited recreational open spaces 'sometimes', with most visits lasting between 30 minutes and 2 hours. This suggests that, while these areas represent meaningful destinations, there is significant potential to increase visit frequency through targeted improvements and programming. Furthermore, primary reasons for visits include relaxation, meeting others, and accompanying children. Therefore, the variety of activities performed within the recreational open spaces highlights the need for multi-functional spaces that accommodate diverse activities simultaneously. This finding has important implications for future planning and design. This call for a balanced approach that enhances relaxation areas, creates inclusive places, improves children's play areas, and ensures flexibility to adapt different uses.

Moreover, satisfaction with the spatial and physical attributes significantly impacted visit frequency, duration, and perception. The more residents are satisfied with their spatial and physical attributes, the more they will use them and the better they are perceived by residents. These findings underscore the critical role of spatial and physical quality in shaping user behavior and perceptions. Notably, while satisfaction significantly influenced visitation patterns and overall perception, it did not influence the types of activities performed. This suggest that planners and designers need to consider other factors when they suggests new recreational open spaces. Consequently, to promote a diverse range of activities, additional strategies such as community engagement initiatives and flexible design may be required.

The results of the study may contribute to formulate a suitable policy in urban planning and urban design, especially related to public open spaces, as a part of development in achieving quality of life for urban residents. To sum up, the following recommendations are proposed for policymakers, urban managers, architects, and planners to ameliorate the livability of existent recreational open spaces and help designing future successful recreational open spaces. At a city scale, pedestrian-friendly and clear, proximate access must be provided to urban residents. Besides, more open spaces need to be created to move towards international standards. At a place scale, consideration needs to be given to its design; also, necessary landscape design elements for a pleasant environment and a comfortable use need to be provided in sufficient quantities.

Effectively, enhancing the quantity, quality, and inclusiveness of public spaces can ultimately promote well-being and livability for all urban residents. The findings also act as a performance indicator of the existing parks, and help urban local authorities address upgrading programs to optimize the existing recreational infrastructure and accommodate the needs of the public. Regular assessment of users' satisfaction and its correlations with use patterns can guide data-driven decisions, allowing for iterative improvements to these vital public spaces.

While this study provides new insights into factors shaping satisfaction and use of recreational open spaces, some limitations should be noted. The analysis focused substantially on spatial and physical attributes without investigating social properties and meanings attached to the spaces. Further research should examine how social dynamics and cultural factors influence residents' satisfaction, use, and well-being. In addition, ethnographic approaches may help explore subtle sociocultural forces and unearth community-specific needs. Overall, this study offers a useful starting point to catalyze further empirical investigation of recreational spaces in understudied developing cities from integrated spatial, social, and cultural perspectives.

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