



Conference Proceeding

Paper presented at Sustainability GEN-4 Post COP 27 Conference 2023, October University for Modern Sciences and Arts (MSA), Egypt

Analytical Study for Assessment of the Green Urban Spaces, Ain Bouaroua Public Garden, Setif, Algeria

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Received: 21 December 2022; **Revised:** 19 May 2023; **Accepted:** 22 June 2023

Abstract: Urban green space offers physical and sensory satisfaction, hence the importance of realizing that a simple wooded area, even randomly scattered, is not enough to provide an ideal urban setting. Developing and designing urban nature with designers and citizens is essential to being beneficial, relevant, and adapted to users' needs. The state of urban green spaces in Algeria, particularly public parks, is currently a subject of debate. These areas have been neglected and significantly altered throughout the various phases of urbanization, resulting in their undervaluation and underappreciation. Public spaces are given less priority and are thus less developed than residential areas, leading to a need for more research, planning, and urban development initiatives focused on them. Rapid urbanization and the emphasis on housing needs have resulted in minimal production of public spaces, leading to a functional approach that needs to be more aware of their intended uses. This article sheds light on our case study, the public garden of Ain Bouaroua in Setif, Algeria. The research methodology combines historical and typo-morphological approaches with those of the users. In order to understand and identify the activities and behaviors of the users, questionnaires are distributed to various actors in the green spaces. The collection and processing of this information and data reveals the current uses and spatial practices while focusing on the evaluation of these green spaces. The results reveal that users' motivations, proximity, and safety, and that the lack of facilities, the low density of vegetation, and the predominance of men are weak points. The proximity of educational facilities attracts schoolchildren. This work can contribute to developing the green network across the whole territory of Setif.

Keywords: urban living environment, public garden, design, spatial practices, Setif

1. Introduction

Green spaces play an important role in cities for the health and well-being of the population. They are currently one of the critical elements determining the attractiveness of the territory and the quality of the living environment. The green space provides its users with optimal conditions for relaxation. From the square to the large urban park, they are centers of recreation, places of rest, walks, games, and sports [1]. Urban planners and policymakers have suggested creating green spaces within an accessible perimeter to maintain human health and well-being [2, 3]. Running, walking, and relaxing activities are negatively associated with health problems, stress, and sedentary lifestyle issues [4]. Walking, an outdoor physical activity, has several health benefits; it can decrease weight, blood cholesterol levels, and blood

triglycerides, thus reducing cardiovascular diseases [5].

In addition, green spaces stimulate and strengthen neighborhood relationships and intimacy among residents. They allow families and friends to come together and strengthen their sense of belonging, intimacy, and communication.

The primary use of plants is aesthetic, as they can be used to adorn, garnish, and beautify the urban environment and thus improve the city appearance; at the same time, they are considered an instrument of civic and moral education for the population [6]. They are a crucial element in creating of an ecological balance within cities in the face of urban distortions due to the unlimited sprawl of cities, causing them to lose their aesthetic and ecological aspects. They are frequently linked to initiatives to ensure urban sustainability. They become crucial in meeting environmental requirements and society's desire to regain nature and improve the urban living environment. They provide acoustic isolation from noise and deactivation of airborne pollutants by plants, microbial [7], and dust, acting as a source of coolness and protecting sensitive areas such as slippery floors. Using vegetation as a management tool can enhance the fight against urban heat islands [8-10].

Managing the city's hydrological cycle while introducing a quality atmosphere impacts residents' perceptions and behaviors. According to Hégron and Torgue [11]: "*The notion of atmosphere allows us to escape precisely from a too strict opposition between subject or object, avoiding the separation between the perception of the environment by the user and the perceived object. It articulates the knowledge of the physical phenomena in presence, their interactions with the built form, the uses of the architectural and urban spaces, the perception of the user, and its various representations*".

The emergence of urban ambiance results from the confluence of the physical characteristics of the environment and the way people interpret them.

Modernity has changed the appearance of today's cities and research on green space is continuously reconsidered and revisited in its conceptual, social, spatial, environmental, and economic dimensions [12].

Thinking about green space is a challenge for urban planning, quality of life, communication, the conceptualization of space, and the structuring of the city, which has suffered for several years from a lack of consideration of nature and the population's needs. However, through their perceptions and uses, the inhabitants can provide much information on their relationship to green spaces and on the essential elements that satisfy their needs [13]. What do they think about it, and what are their expectations regarding its use?

As urban green spaces offer physical and sensory satisfaction, developing and designing urban nature is essential to be beneficial and responsive to users' needs.

In Algeria, urban green space is currently the subject of debate, particularly concerning public gardens, raising questions about the reality of these places' level of use. The design of such spaces does not always correspond to social aspirations. The city actor is much caught up in the housing shortage and its reabsorption [14-16] and was not concerned with the quality of the vegetated non-built space, which had remained for a very long time relegated to the last rank of priorities for city managers [17]. These areas have been neglected and significantly altered throughout the various phases of urbanization, resulting in their undervaluation and underappreciation. Public spaces are given less priority and are thus less developed than residential areas, leading to a dearth of research, planning, and urban development initiatives focused on them. Rapid urbanization and the emphasis on housing needs have resulted in minimal production of public spaces, leading to a functional approach that lacks awareness of their intended uses.

The city of Setif, similar to other Algerian urban centers, has undergone significant urban development over the years. The French occupation of 1843 initiated a foundation process that involved rebuilding the city on the remains of the Byzantine citadel. This process created a functional urban center that prioritized ecological balance and was characterized by many public green spaces within its walls. The city was organized according to the principles of modern urban planning, which included the establishment of regular lanes for closed blocks. Nonetheless, after independence in 1962, Setif experienced rapid urban growth and housing projects that led to the gradual expansion of the city along with spontaneously added areas. Consequently, there emerged different levels of morphological divergence from the colonial period, which negatively affected public space, including public gardens that were overlooked in favor of collective housing. These new areas formed a new urban belt, which, although of average size and located close to each other, lacked outdoor facilities such as various networks, playgrounds, and public gardens.

Despite the colonial influence on the city's development, it was not until the first three decades after Algeria's independence that public places were given their first legal framework, starting in 1990.

After the enactment of Law No. 2006-06 of 20 February 2006, the Algerian state prioritized the restoration of the city's image and the improvement of public spaces. Additionally, a law on the maintenance, protection, and development of green spaces was introduced in 2007. This study aims to shed light on the state of urban green spaces in Algerian cities, focusing on the city of Setif. To achieve this, an exploratory methodology was developed to define the practices and uses of the public garden of Ain Bouaroua. It is essential that the design of these green spaces, in terms of their form and use, respond to the needs of the inhabitants and ensure their well-being.

2. Methodology

In the case of the public garden of Ain Bouaroua in Setif, the main objective is to detect the relationship between design and use and human well-being; therefore, the evaluation of uses is necessary through a combined historical and typo-morphological approach. This research is based on situational observation to observe, understand, and identify the activities and behaviors of users in these public places. Meanwhile, research questionnaires were distributed to different actors in green spaces; these techniques allowed us to collect all the information in our corpus of study.

We set up a schedule for the observation campaigns before the operation, where we allocated four days: two days off (on weekends) and two days of work. These observations are carried out in two stages, the first in July and the second in October, to confirm, reinforce, and collect more data. After observing the public garden on the selected days during the four hours (morning, noon, afternoon, and night), the data collected from these observations will be analyzed and processed. In order to compare the intensities of the different types of appropriation, the results recorded on the observation grids will be translated into graphs.

The various stakeholders in the green spaces are interviewed, including city managers and users, through questionnaires. A survey is a quantitative method that identifies significant characteristics of social groups and statistical imprecisions. The proposed survey is composed in part of direct questions designed to gather the opinions of users and managers of the gardens and allow a better understanding of the value they place on these spaces. Moreover, concerning open-ended questions, no request for clarification or intervention was made. This arbitrary decision is explained by the desire to obtain unplanned information. The collection and processing of this information reveals current spatial uses and practices while focusing on the evaluation of the users of these green spaces.

Methodological limitations: limitations of the study exist and can be identified. First, there are only 25 people in the entire exploratory study sample. This study was conducted in only one garden, which is Ain Bouaroua. Neither the users of other gardens nor those who do not frequent green spaces were considered. However, this exploratory methodology allows you to evaluate the relevance of your choice of tools, research technique, and collection of information through observation, thus allowing you to achieve your predetermined objectives.

3. Case study of Ain Bouaroua Public Garden, Setif

The present study focuses on Setif, a region situated in the southeastern part of Algiers [18]. Within this region, a notable feature is a public garden known as Ain Bouaroua, positioned to the east of the historical center of Setif, Algeria, at an approximate distance of 1,100 m [19]. Of particular significance is the garden's adjacency to three cemeteries: the Sidi Said cemetery, the Jewish cemetery, and the European cemetery, which collectively contribute to the provision of urban green spaces. The strategic positioning of the garden is noteworthy due to its proximity to various surrounding neighborhoods characterized by a diverse array of housing types, encompassing both collective and individual dwellings. Noteworthy neighboring areas include Cité Yahiaoui to the north, Cité Ruisseau d'Or (Golden Streams) to the east, and Cité Bouaroua to the southwest. Additionally, a collection of educational institutions border the garden on its western side (see Figure 1). Dating back to 1996, this garden has experienced expansion, covering a substantial total area of nearly 1.6 hectares, and it remains fully accessible to the general public.



Figure 1. Location of the park within the city and its engagement with the neighbors [19]

The significance of this study lies in capturing the practices and sentiments of the residents about the recent redevelopment of the Ain Bouaroua Public Garden and its adjoining road in 2018, titled “Redeveloping the Garden Ain Bouaroua and Its Adjacent Road”. This area had experienced a prolonged period of neglect, becoming a conspicuous issue within the region for multiple years.

3.1 Historical analysis

The study area has experienced several developments over time (refer to Table 1).

Table 1. Historical development concerning the city of Setif

Period	Plan or map	Comment
1933 to 1962	The advent of working-class neighborhoods [18]	<ul style="list-style-type: none"> • 1940 to 1957: We notice that the study area has experienced only limited interventions, like establishing some facilities (Mobile Guard, Sheikh Abdou School, and Naftal Park). • 1954: In the north-east, an informal district is in formation, laid out on private indigenous land, which will produce the largest informal district in the city, called Tandja. Over time, Tandja became a cancer in the city [20]. • At that time, the garden was not exploited yet; it was an open space without being built on or developed except for the water source in Ain Bouaroua.
1962 to 1980	The advent of the suburbs and the sprawl of the city towards the north-east [18]	<ul style="list-style-type: none"> • 1967 to 1969: The three-year plan acquires and consolidates a program of 580 dwellings, many of which contribute to the development of the study area. • 1970 to 1979: The Port Said Boulevard is part of the structuring elements linking the northern suburb to the station and the spontaneous neighborhood of Yahiaoui (Tandja). Among the impacts of the boulevard, we noticed the breakup of the observatory square. Instead, a small centrality was created, structured by the boulevard, composed of the market and the Bakhouche Middle School [18].
1980 to 1989	Plan of the city of Setif in 1988 [18]	<ul style="list-style-type: none"> • The restructuring of the Cité Yahiaoui by the drainage of the Oued Bouaroua River or Stream, the roadway, the range of amenities, the square's arrangement, and the district weaving.
1995 to 1996	Ain Bouaroua Public Garden development in 1996 [21]	<ul style="list-style-type: none"> • The province launched the improvement process in the city of Setif, targeting several districts, including Ain Bouaroua. This was an operation to upgrade public spaces. Within its framework, the Confédération Algérienne du Patronat (CAP) proposed to take care of the revival and development of the water source in Ain Bouaroua while exploiting the public space next to it as a garden [18]. • There was an opportunity to restore this public space since the local authorities decided to keep it from becoming a twilight place for perverts and thugs.
2000 to 2002	Roman stone walls (in combination with concrete blocks)	<ul style="list-style-type: none"> • In 2000, the Municipal Committee against water-borne diseases declared the water of Ain Bouaroua Spring no longer drinkable because it contained large amounts of nitrates. Thus, the authorities decided to close it in 2002 for people's health security. • As this space was characterized by a play of volumes and differences in levels, it was redeveloped by building walls of Roman stones extracted below the Park Mall during the excavation works (ruins in the dumps).
2018 to 2021	Ground plan of Ain Bouaroua Public Garden before and after the modification by the local authorities [21]	<p>Redevelopment of Ain Bouaroua Public Garden and the adjacent road</p> <ul style="list-style-type: none"> • On March 19, 2018, the follow-up of the project was launched by the municipal technical services with the design office. • The project was stopped several times during the COVID-19 pandemic, which delayed its completion until 2021. • The project has undergone several changes by the local authorities and has not kept the initial design carried out by the design office, and this is to reduce its cost due to the financial crisis that the COVID-19 period has experienced.

3.2 Urban composition principles

3.2.1 Urban re-design of the adjacent road

The escalating traffic volume presents a significant urban viability challenge, necessitating the implementation of novel, effective, and sustainable strategies to enhance the appeal of public development. The area has experienced persistent traffic congestion for years, attributable to insufficient road upgrades despite ongoing development, housing expansion, and facility proliferation. Consequently, this congestion has adversely affected the flow of individuals towards the garden. To address this issue and optimize connectivity, accessibility, and visitorship to the public garden, it was imperative to reconfigure the surrounding road infrastructure prior to its redevelopment (refer to Figure 2).

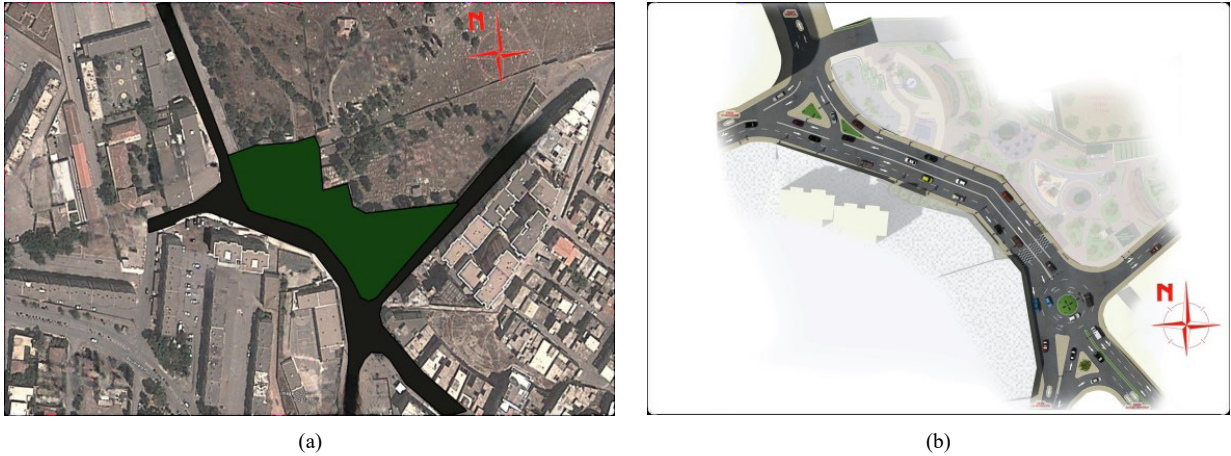


Figure 2. Redevelopment of (a) Ain Bouaroua Public Garden and (b) traffic plan [21]

3.2.2 Garden re-design

English gardens partially influenced the garden design, as indicated by the design office [22, 23]. English gardens are characterized by their meandering paths and more organic layouts, aiming for a natural and tranquil ambiance that complements and enhances the surrounding nature. In the case of the studied garden situated on uneven terrain, the topography dictated its irregular and organic geometric form, leading to the incorporation of curved pathways (refer to Figure 3). Emphasizing the water source as a critical element, the architect strategically positioned large deciduous trees in its vicinity, creating a clear space around them. Despite the temporary closure of the spring for sanitary reasons, efforts were made to preserve its historical significance by reconnecting it to the drinking water supply and restoring its functionality (refer to Figure 4).



Figure 3. Site topography [21]



Figure 4. The water source in Ain Bouaroua

In addition, the spatial arrangement of the garden incorporated the establishment of a central focal point, serving as the convergence point for all curved pathways. This focal point was skillfully adorned with grass and a pergola. Moreover, the principle of contrast played a significant role in the garden's composition, mainly through the arrangement of grassy areas where the vegetation seemed to overflow from the massif (refer to Figure 5).



Figure 5. Image showing the focal point of the first design [21]

3.2.3 General garden components

The paths and alleys within the garden exhibit a winding layout, utilizing sturdy materials such as concrete and tiles. These pathways are delineated by steps and gentle inclines. Additionally, in the vicinity of the water source, there is an area covered with natural stones and earth, providing a distinct ground surface (see Figure 6).

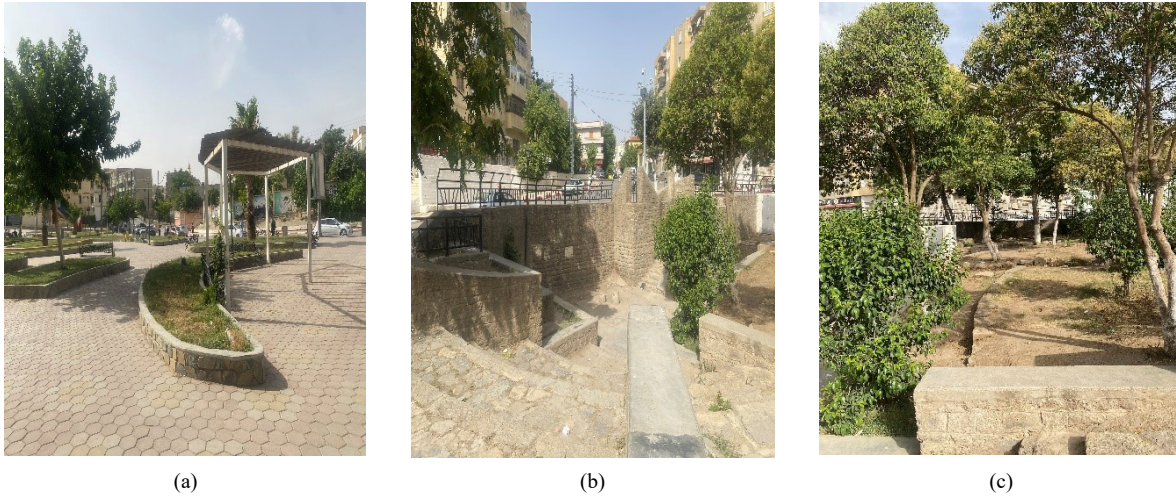


Figure 6. (a) The alleys, (b) the water source, and (c) the area covered with natural stones and earth of Ain Bouaroua

The garden incorporates urban street furniture made of durable materials, including:

- Wrought iron benches for rest.
- Trash cans and litter bins contribute to city cleanliness.
- Lighting posts and pergolas made of metal and wood.
- Furthermore, a tile mural measuring 1×1 m captures the historical significance of Ain Bouaroua and the water source. Composed of diminutive ceramic tiles, the mural adds diversity and attractiveness to the garden. The water source, known colloquially as “rass idour” or “golden stream”, originated from this fountain and traversed the southern part of the city. It primarily served as a space for women who used it for extensive washing of “burnous” and “hiek” (which are traditional garments), as well as large conventional woolen blankets woven at home, as shown in Figure 7.



Figure 7. (a) Waste garbage cans, (b) benches in wrought iron, and (c) the mural of Ain Bouaroua

The garden plant components consist of a dominant tree species inventory, as depicted in Figure 8:

- Deciduous trees are strategically placed as solitary specimens in the center of a riverbed. At the same time,

evergreen conifers, which retain their foliage during winter, are utilized to form hedges with a spacing of 1.5 to 2 m.

- Shorter varieties create curtain hedges near the cemetery, offering an aesthetically pleasing view from behind the cemetery wall.
- Palms, valued for their foliage, are intentionally scattered throughout the garden with ample spacing.
- The alignment trees are positioned along the street and exhibit crucial attributes such as a regular, straight appearance with balanced elements.



(a) Varnish from Japan



(b) Common ash



(c) Aleppo fir



(d) Trees of alignment



(e) Trees of alignment

Figure 8. Types of trees in the public garden of Ain Bouaroua

Climbing plants and grassed areas play significant roles in the garden, as illustrated in Figure 9. Climbing plants serve two purposes: adorning walls and ascending on pergolas or trellises. The grassy grounds form an integral component of the garden landscape.



Figure 9. Climbing plants and grassed areas in the public garden of Ain Bouaroua

4. Results and discussions

4.1 Observation result

A schedule has been devised for the observation campaigns, encompassing a four-day timeframe comprising two work days and two days off (weekends). The observations are conducted in two phases, the first occurring in July and the second in October. During four designated periods (morning, noon, afternoon, and night), the public garden is observed, and the data collected in observation grids is subsequently transformed into graphical representations. Our observation grid encompasses various types of practices transpiring in the garden. We meticulously record and assess them using the Likert scale, ranging from 1 to 5 (1 = no intensity of use, 2 = low intensity of use, 3 = average intensity of use, 4 = high intensity of use, and 5 = very high intensity of use).

A Likert scale is a nominal and ordinal scale that measures a variable (a 01 category) in an established order from largest to smallest [24]. It is ideal for assessing people's attitudes and behaviors.

The public garden of Ain Bouaroua is considered the favorite place for many citizens of Setif, where one can distinguish several activities such as resting, walking, meeting, and leisure.

The intensity of women's walking activity in the public garden is observed to be average (3) on weekends in both July and October, particularly after 4 p.m., and even on weekdays in the month of October. We have also noticed that there is no intensity (1) at noon on Fridays and low intensity (2) at noon on the other days.

The public garden of Ain Bouaroua serves as a pedestrian pathway to various destinations, which explains the moderate presence of women, particularly during the evenings and after work hours on weekends, which serve as their rest days, as depicted in Figure 10.

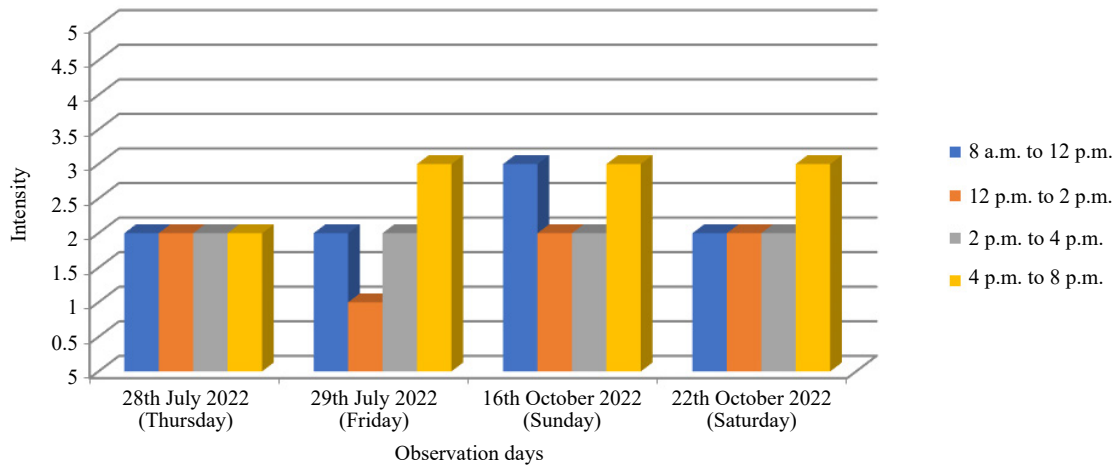


Figure 10. Intensity of women's walking activity

The intensity of resting in the garden among men is relatively higher, ranging from average intensity (3) to high intensity (4) during evening hours across all days, particularly on Fridays. Additionally, Saturday mornings exhibit a high level of intensity, while other mornings demonstrate a lower intensity. These men visit the garden to engage in various activities, primarily resting and sitting. Figure 11 demonstrates that from 12 p.m. to 4 p.m., the intensity of activity is minimal (1) on all days except Saturdays in October, when it increases to a low level (2).

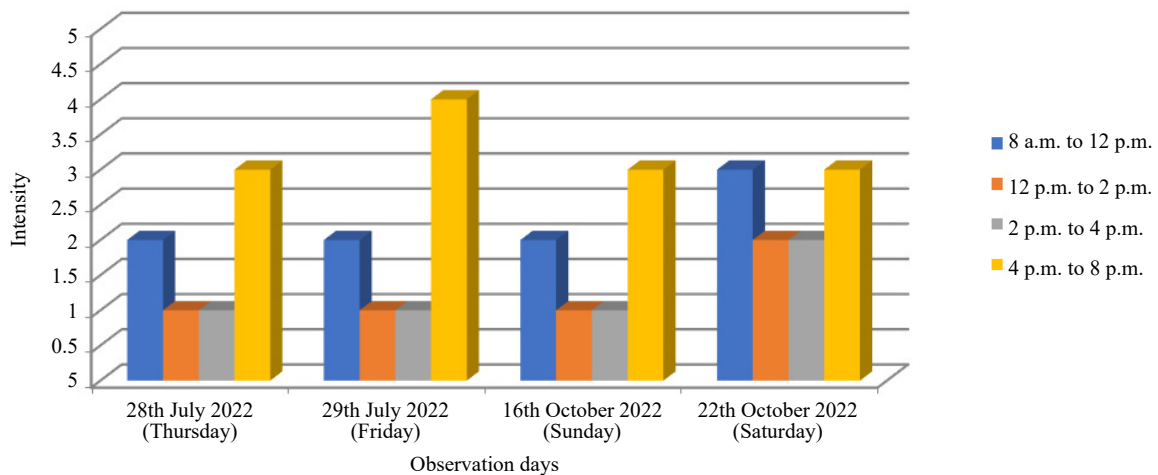


Figure 11. Intensity of men's resting activity

As shown in Figure 12, the intensity of women's meetings is medium (3) during the evenings, especially on days of rest, and high (4) during the evenings in summer, with no intensity (1) between 12 p.m. and 4 p.m. on all days. They gather in the garden to meet and discuss matters with friends and other family members.

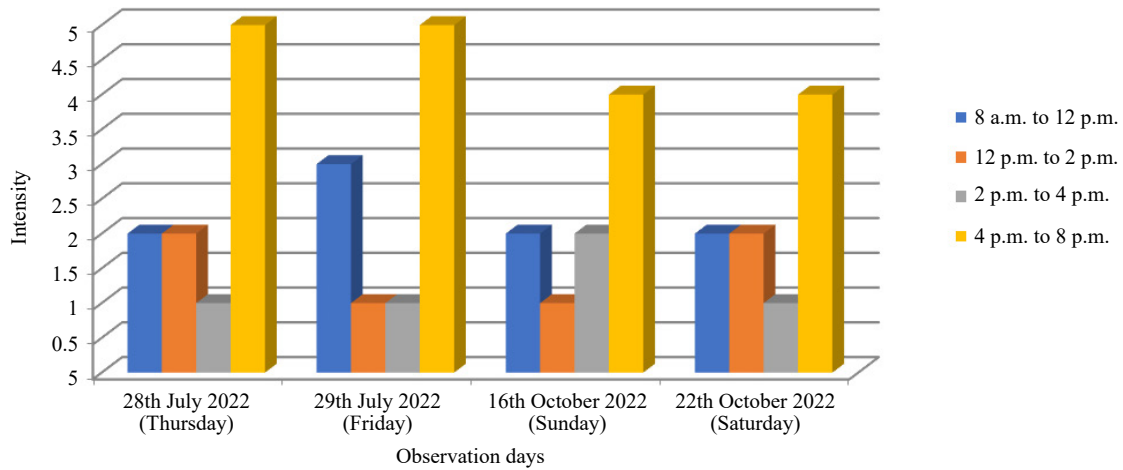


Figure 12. Intensity of women's meeting activity

The intensity of men's meetings is high (4) during the evenings and very high during the evenings of summer (5); it is seen decreasing in the morning of all the days to low density (2) except Friday morning (average). It wavers between weak (2) and non-existent (1) from 12 p.m. to 4 p.m.

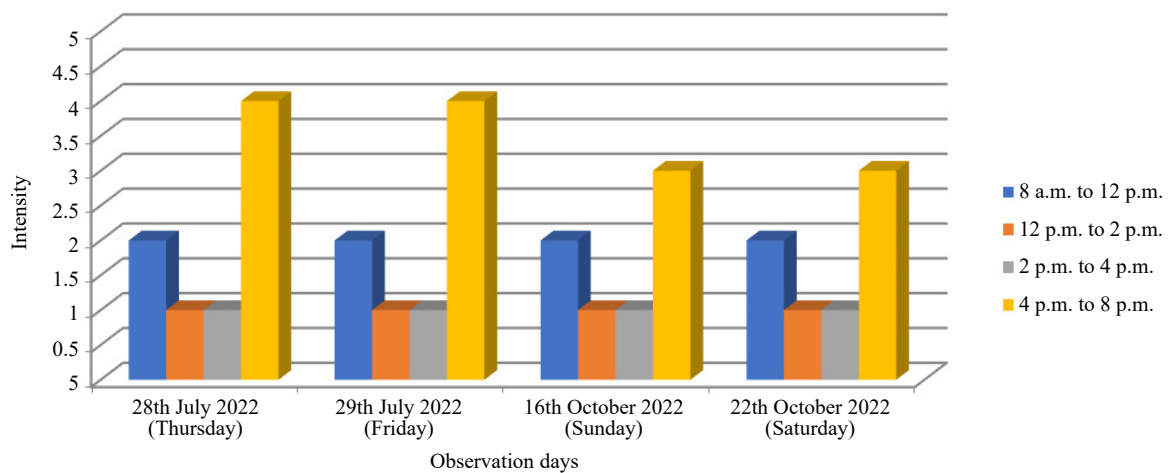


Figure 13. Intensity of men's meeting activity

Figure 14 represents the intensity of children's leisure activity, which is more noticeable and higher (4), especially during the summertime and most frequently after 4 p.m., since parents take advantage of these free moments to accompany their children to play despite the lack of playgrounds. There is an average intensity (3) of leisure activity after 4 p.m. on working days, zero intensity from 12 p.m. to 2 p.m. on all days, and between zero and medium intensity from 2 p.m. to 4 p.m.

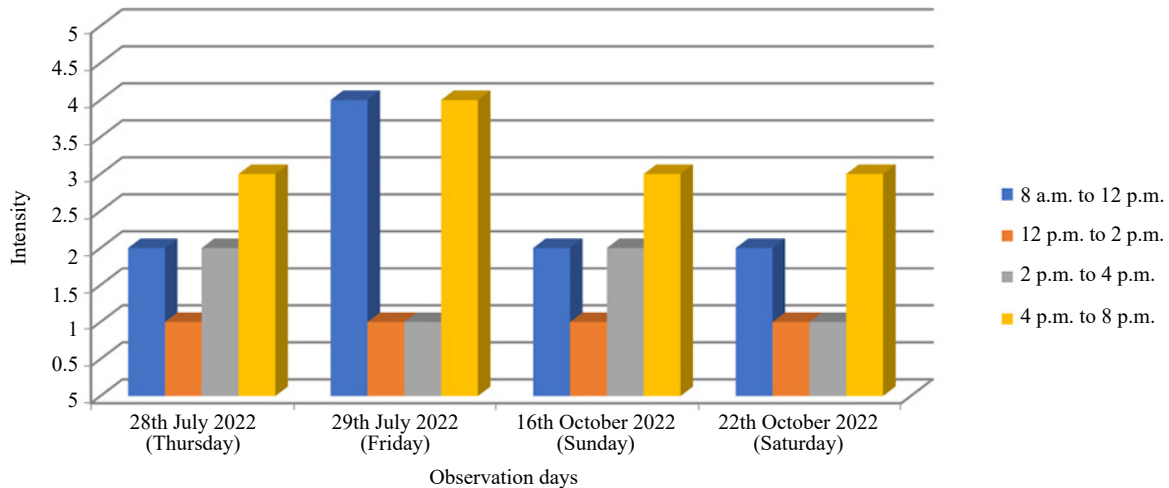


Figure 14. Intensity of children's leisure activity

The provided graph (see Figure 15) depicts the elevated and prominent intensity (4) of children's resting activities, mainly observed during school days from 12 p.m. to 2 p.m. It is noteworthy that middle and elementary school students, particularly those residing far from school premises, lack alternative spaces for rest.

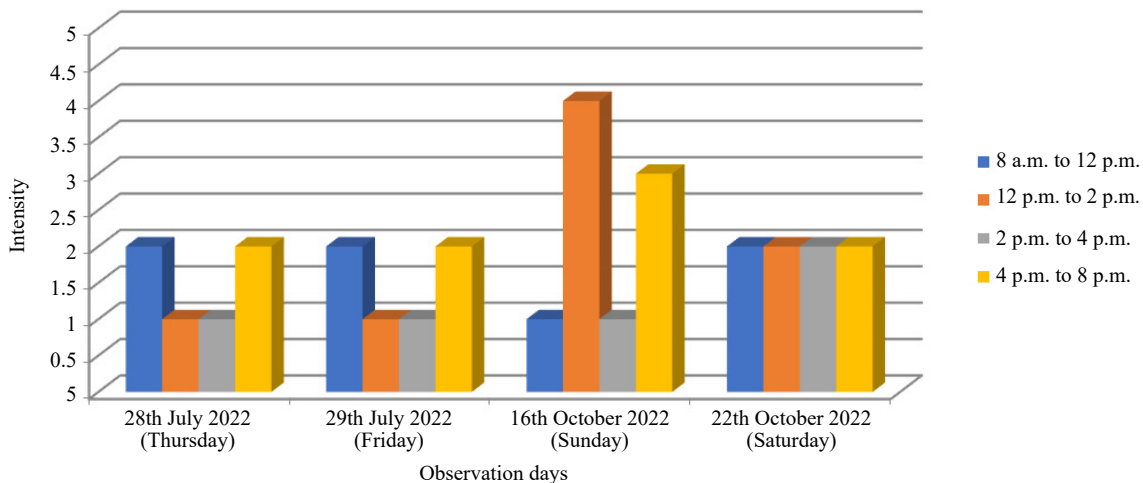


Figure 15. Rest intensity by category

4.2 Discussion of the observation result

The garden attracts a diverse range of visitors, encompassing all age groups and genders. The users' activities primarily revolve around social gatherings, rest, passing through, and leisure. Through our observations, we observed a significant influx of visitors, particularly on weekends, seeking relaxation. It is notable that the garden is predominantly frequented by men.

The morphology of the garden, open to the urban space, has contributed to its use as a passage by women to reach different destinations and shorten the distance, as well as to avoid crossing the main street crowded with men. If they use the garden for meetings, they prefer to sit next to the water source for two main reasons. The first is morphological. Women prefer to be located in places hidden from the main road and not exposed to pedestrians. Therefore, they prefer to sit next to the water source, as the place is distinguished by the fact that it is the highest level of the roadside and

surrounded by multiple elements such as furniture and walls surrounding the water source, as well as trees and greenery, which are considered the most important elements of encirclement, making the place more confined, which makes them feel safe and protected.

The second reason is historical. For women, the water source is the place of their mothers' and grandmothers' gathering. It was a space belonging mainly to the domain of all those women who went there with their children for the big washings of big traditional blankets. Hence, most of today's Setifian women have memories of the water source and their belonging to this place. It is a matter of nostalgia for their first years of youth.

Thus, in 2018, these changes related to the design of the roadway adjacent to the garden have contributed to increasing traffic around this public space and its total openness to the street with 70% of its total area, which resulting in a change in its structural characteristics. It has also contributed to an increase in the flow of visitors from different categories, with women returning to the site after an interruption of several years, although at a lower rate than men, who represent the most visited category. This confirms what Badeche [25] mentioned in his study on the impact of the spatial organization of public gardens on users' feelings, which concludes that their redesign helps activate their role in the city.

As women and men always seek to delineate their spaces and create a distance between them, two types of places exist in the garden: a place inside, a little veiled from the street and pedestrians, which represents 30% of the garden area and is visited by females in most cases; and a place outside, located at the end of the garden in direct contact with the street, which represents 70% of the garden area and is a male-dominated place in most cases. Therefore, the small area of veiled places in the garden has contributed to the decrease in the rate of women who come there due to the adherence of Setifian women to their cultural and religious beliefs, which encourage them not to expose themselves to strangers. Moreover, we saw this in the study by Hakim [26], who concluded that cultural, religious, and social norms are the main foundations that influence architectural and urban design.

The average intensity of leisure activity on working days after 4 p.m. is due to the middle school and elementary school students who come to play together before going home. Hence, the location of the garden near the educational facilities has given specificity to the category of users, which is primarily middle school students.

4.3 Questionnaire results and discussion

The questionnaire is composed of a set of questions linked in a structured way in order to allow the methodical collection of information within the framework of a survey. It allows for the extraction of precise and exploitable data, often presented in the form of tables or graphs.

4.3.1 Axis number 1: Characteristics of the study sample

The gender distribution in the garden reveals a clear male dominance, with men constituting 60% of the visitors while women comprise 40%. The garden attracts individuals across various age groups, with the highest percentage observed among middle-aged visitors at 28%, followed by young adults at 24%. However, among women, there is an increased representation in the age group of 26 to 35 years, while children account for 16% of the visitors.

Regarding occupational diversity, public servants constitute the most significant percentage at 36%, primarily dominated by men. Students represent 20% of the visitors, followed by self-employed individuals and the unemployed, each accounting for 16% of the population. Notably, a higher proportion of unemployed visitors are women. Retirees form the smallest percentage at 13%, predominantly comprising men, as depicted in Figure 16 (b).

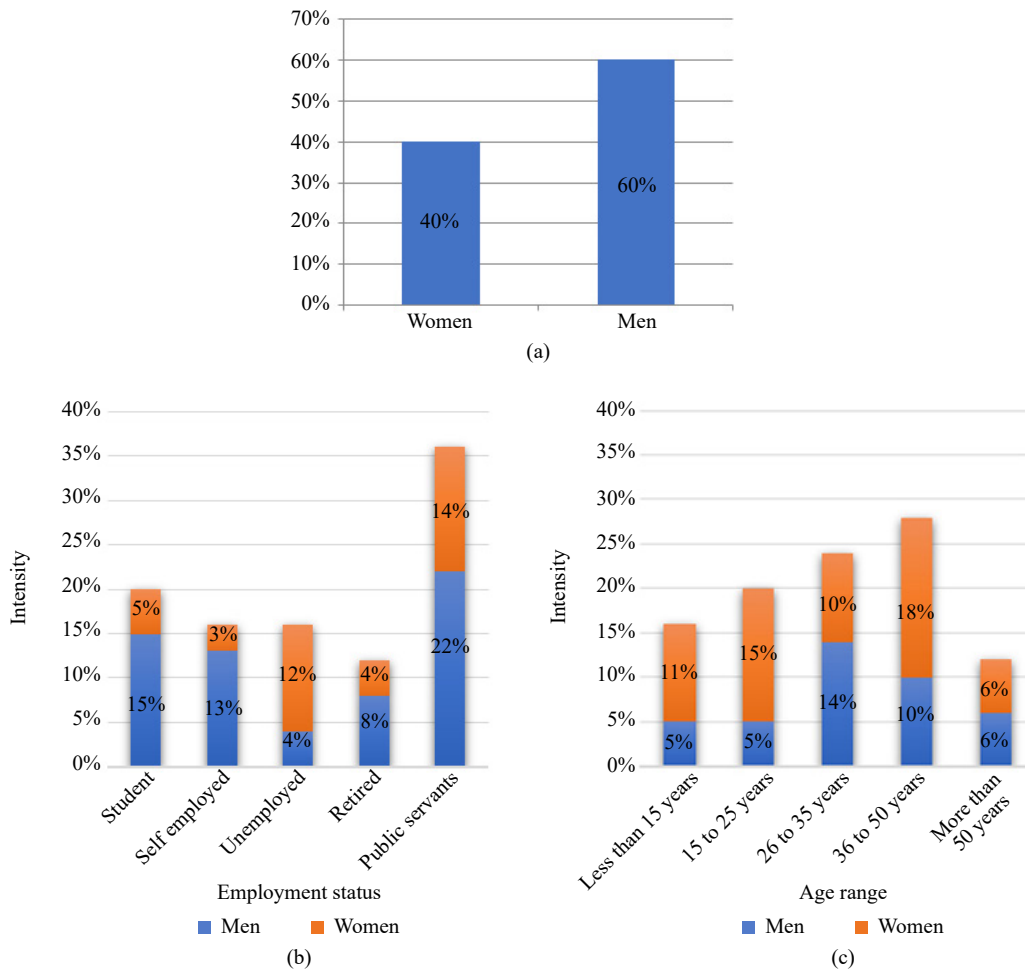


Figure 16. Variables of (a) gender, (b) employment status, and (c) age range

4.3.1.1 Discussion

The percentage of men exceeds that of women in the garden due to the lack of female facilities and commercial services, as well as the lack of places that give women privacy. Most places are open to the urban space, and there are only a few tea and bean tables at the edges of the garden as a kind of illegal trade that targets only men.

The influx of all age groups into the garden is because it is the only recreational space available for the nearby neighborhoods. Due to a large number of movements and noises next door, individuals over 50 prefer quiet environments.

The garden is frequented by visitors from various jobs, and the highest percentage is for public servants, as it is an outlet for them to get rid of work pressure, especially after 4 p.m. The school students follow them due to the garden's proximity to several educational institutions.

Therefore, through this diversity in age groups and the social activities in the garden, it became clear to us that it is a place of diversity and equality. However, this equality has some limitations in terms of use for women.

4.3.2 Axis number 2: Questions concerning the garden's usage and frequentation

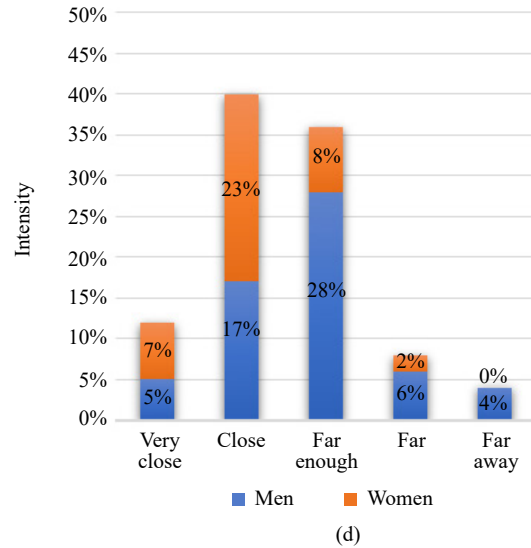
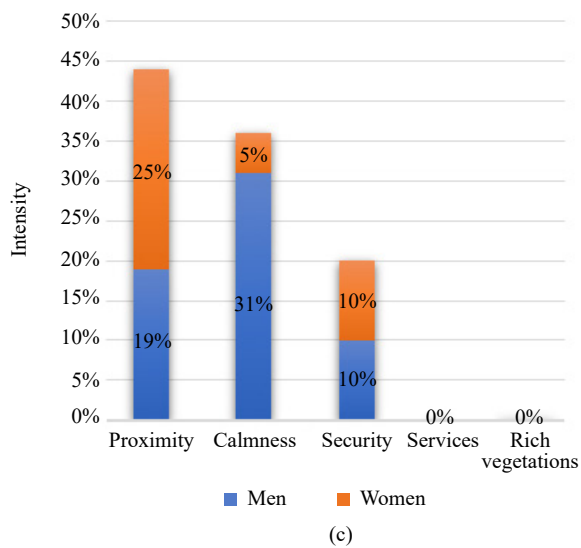
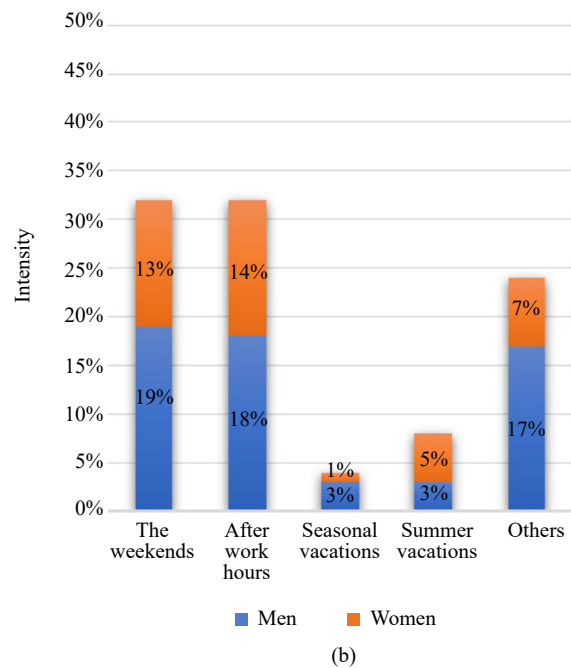
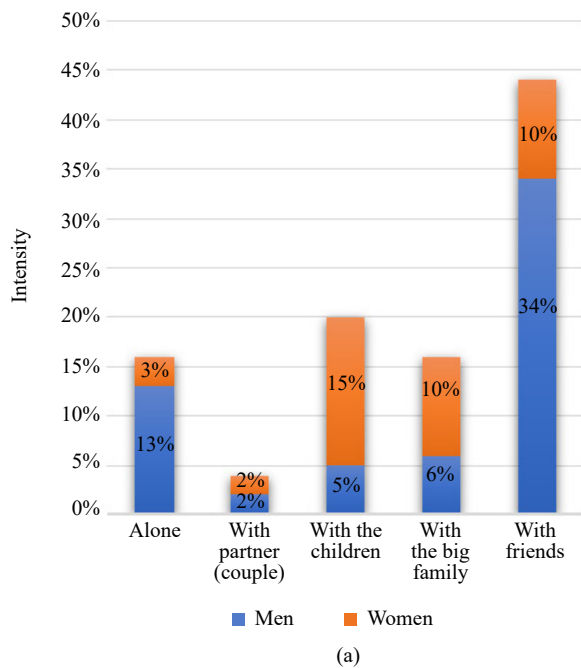
According to Figure 17(a), most users spend their free time with their friends, and a large percentage are men (30%). As for the visitors coming with their children, their percentage is 20%, and most are women (15%). A small percentage (4%) are with their partners. A large percentage of men also visit the garden alone, while it is almost nonexistent for women to visit alone.

Many users (32%) mentioned they visited the garden mainly on weekends, more than on other days. A similar percentage (32%) visited after working hours and 24% visited other times.

Most people who use the garden are men, and 44% of them do so because of its close proximity to homes (primarily women), 20% because of its safety, and 36% because of the abundance of quiet.

On the other hand, 40% of the visitors to Ain Bouaroua Public Garden live nearby, most of whom are women, but 36% live far away (primarily men), and 12% live very close to the place.

When it comes to the preferred locations of visitors, the majority of women (25%) prefer the location next to the water source, followed by respondents who sit a sufficient distance from the road (27%) and the location of the water source (20%). The majority of them are children, but there are no women in the area close to the road, and the percentage of women in the area near the trees and grass does not exceed 9%.



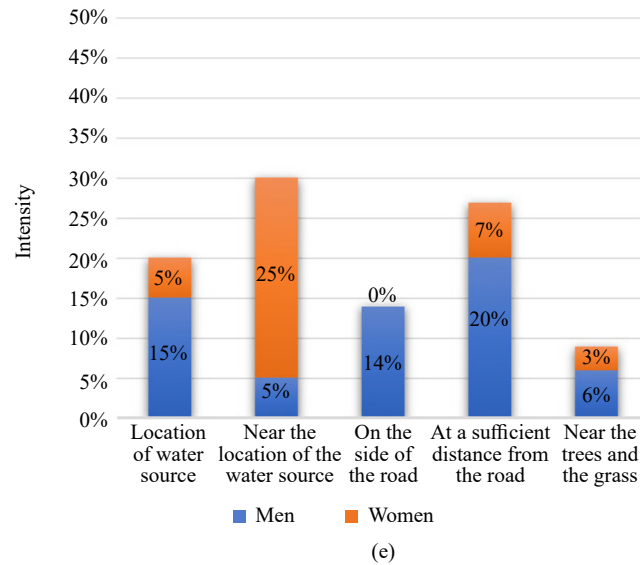


Figure 17. Variables of the (a) accompaniment, (b) time of the visit, (c) visit motivation, (d) proximity of the garden, and (e) preferred location

4.3.2.1 Discussion

We see that most visitors spend their free time with their friends, as the garden is a destination to sit and talk due to the absence of other activities, but a large group of men prefers to sit alone to rest. As for women, they are rarely alone in the garden but always with their friends, children, or families. This is due to Algerian society's cultural and religious beliefs, as it is not desirable for women to sit alone in public places where strangers are present and are therefore exposed to their direct observation.

The preferred time to visit the garden varies depending on the users' work, but most prefer after working hours and weekends because most are employees. In addition, it is a place located next to educational institutions where children used to play together after 4 p.m. until the evening before going home.

We find the frequency of use is directly proportionate to the proximity to the users' home, especially for women, since this is the primary motivating factor for them, as public places close to their home and neighborhood generate safety for them. They prefer to be in the city, while men access places far from home easily and without fear, even outside the city. Mozingo [27] refuted this outcome. According to a study on how men and women behave differently when using public spaces, men prefer noisy places in the downtown area. In contrast, women prefer quiet places outside of the city limits. This inconsistency in the results is due to the different social environments of the two samples studied.

There is also a disparity in the proportions of preferred locations, as users thrive on forming their own boundaries and spaces to preserve their relationships. Similarly, men prefer to exploit the open space on the road, depending on their age. Older people prefer to sit at a sufficient distance from the street because they adhere to their religious beliefs by respecting the road and not observing passersby, especially women, unlike young people who sit directly at the side of the road. This generation is more tolerant of cultural and religious beliefs.

Meanwhile, most women prefer to sit next to the water source because it is the least exposed place to passersby, which gives them a sense of privacy and allows them to observe their children playing at the water source, which is the children's favorite place to play. In the absence of children's playgrounds, the morphology of the place, characterized by a composition of volumes and differences in levels, created a dynamic environment in which children practiced jumping and skating. As for the lowest percentage, they prefer to sit next to trees and grass; most are elderly. The present research conceives of this dialectic relationship between the morphology of space and its experience. This result was previously confirmed by Gherraz [28] in his empirical research, and urban morphology is one of the factors that influence the practice of public spaces and their intensities of frequentation.

4.3.3 Axis number 3: Questions regarding the design and level of services in the garden

According to Figure 18(a), most of these visitors find the style of design pleasant (48%), and most of them are men (33%). However, 36% of the respondents said they liked it a little, mostly women, while 4% said they did not like it. While people are in the garden, it is evident that most feel safe; 40% of respondents indicate that they feel very safe.

According to the results, we conclude that the abundance of urban furniture in the garden is not available, as the highest percentage of users (56%) responded that it is not available. This was confirmed by both sexes, and in similar proportions (12%), others responded with available or a little is available. About 6% said it was not available at all, and most of them were women.

We also found from the results that the garden suffers from a deficit in terms of plant density. 40% of the respondents responded that it is not available, 27% of whom were men; 24% answered that a little is available; 20% answered available; and 16% answered not available.

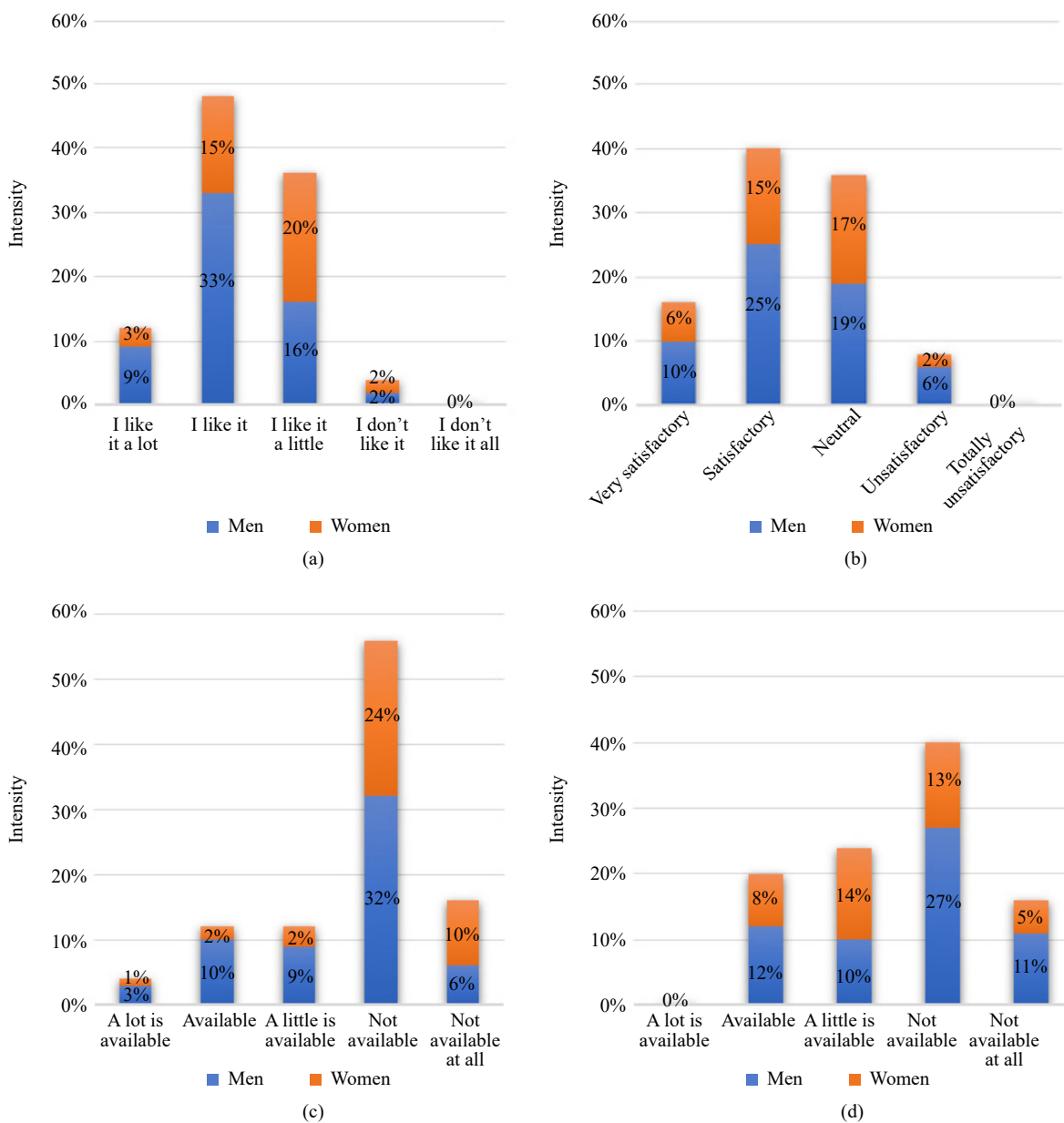


Figure 18. Variables of (a) design style assessment, (b) sense of security, (c) street furniture abundance, and (d) vegetation density

4.4 Discussion of questionnaire results

The design was well liked by the majority of visitors. But we repeatedly observed resistance to these new open designs, with men and women defining their own spaces in the garden and the need to place elderly men at a sufficient distance from the street to maintain privacy and respect for the relationship between opposite genders, which relates to religious and cultural beliefs. Meanwhile, the respondents, who would prefer to see facilities offering services and recreational spaces, declared that the lack of facilities, street furniture, and the small size of the garden are the main disadvantages of the area, which has seen an increase in visitors as a result of its easy access and use as a crossing point to reach various destinations.

5. Conclusion

At the end of this study, the importance of people's desire for green spaces is evident; it is a crucial element in the daily lives of city dwellers for their physical and emotional health. Since it is the cradle for most age groups to free themselves from the pressures of life, it is important to carefully select qualified people in the field of designing green spaces since the lack of equipment and urban furniture, the small size of the park, as well as the lack of vegetation have annoyed Setifian users.

The garden must be connected to its immediate environment by using the assets of the fabric, the urban landscape, and the natural points to make it a dynamic element. For example, the presence of the garden near the water source, which has historical value, has increased its heritage value.

The transformations that occurred in the configuration of the garden and the adjacent road modified its structural characteristics, which positively affected the perception of the space. This is due to the creation of appropriate conditions in terms of accessibility and an increase in the number of visitors. On the other hand, negative points pointed to the horizon, especially considering cultural beliefs in terms of use.

In recent years, urban planning research has increasingly emphasized the importance of green and blue networks in pursuing sustainable development, underscoring the need for more urban parks. One legislative response to this issue was Algeria's 2007 law governing the green spaces' upkeep, preservation, and planning. The legislation aimed to improve citizen well-being, safeguard public health, and maintain ecological and climatic equilibrium. This law established a comprehensive policy framework for expanding and promoting green spaces within urban areas, requiring the inclusion of such spaces in all construction projects and in urban planning and architecture studies conducted by both public and private entities. However, the nature of society and cultural beliefs were not considered, despite the law's ambitious goals in applying it on the ground.

The public gardens in Algeria are always subject to particular appropriations that reflect the nature of the community and their cultural and religious beliefs regarding access and use. Undoubtedly, the urban morphology, spatial configuration, and historical dimension of the garden intervene in the organization of use according to gender and in behaviors according to age. Therefore, it must consider the nature of the place from a material and immaterial point of view, as cultural beliefs can help increase the effectiveness of these public gardens.

Conflict of interest

There is no conflict of interest in this study.

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Appendix: The questionnaire

Topic: Analytical study for assessment of the green urban spaces, Ain Bouaroua Public Garden, Setif, Algeria.

Garden: _____

Form number: _____

Section 1: General information

1. Gender

- Woman
- Man

2. Age range

- Less than 15 years
- From 15 to 25 years
- From 26 to 35 years
- From 36 to 50 years
- More than 50 years

3. Grade level

- None
- Primary
- Medium
- Secondary
- University

4. What do you do for a living?

- Student
- Self employed
- Public servants
- Retired
- Unemployed

5. Are you from the city of Setif?

- Yes
- No

6. If not, from which region? _____

Section 2: Questions concerning the use and frequentation of the garden

7. When do you visit the garden?

- The weekends
- After work hours
- Seasonal vacations
- Summer vacations
- Others

8. At what time of day do you often visit the garden?

- 8 a.m. to 12 p.m.
- 12 p.m. to 2 p.m.
- 2 p.m. to 4 p.m.
- 4 p.m. to 8 p.m.
- 8 p.m. to 10 p.m.

9. Who do you visit the garden with?

- Alone
- With partner (couple)
- With the children

- With the big family
 - With friends
10. Why do you visit this garden especially?
- Proximity
 - Calmness
 - Security
 - Services
 - Rich vegetations
11. Is the garden far from your house?
- Very close
 - Close
 - Far enough
 - Far
 - Far away
12. What are your favorite places when visiting the garden?
- Location of the water source
 - Near the location of the water source
 - On the side of the road
 - At a sufficient distance from the road
 - Near the trees and the grass
13. Why is this your favorite place
-
-

Section 3: Questions regarding the design and level of service of the garden

14. Do you like the current design style of the garden?
- I like it a lot
 - I like it
 - I like it a little
 - I don't like it
 - I don't like it at all
15. Is security provided at the Ain Bouaroua Public Garden?
- Very satisfactory
 - Satisfactory
 - Neutral
 - Unsatisfactory
 - Totally unsatisfactory
16. In the garden, is there sufficient street furniture for all the needs of the visitors?
- A lot is available
 - A little is available
 - Available
 - Not available
 - Not available at all
17. Is the urban furniture in the garden varied?
- Totally agree
 - Agree
 - Neither agree nor disagree
 - Not at all agree
18. Is there a density of vegetation available in the garden?
- A lot is available

- A little is available
 - Available
 - Not available
 - Not available at all
19. The vegetation in the garden is varied
- Totally agree
 - Agree
 - Neither agree nor disagree
 - Not at all agree

20. In your opinion, what are the disadvantages of this garden?

21. What are your proposals to renew and revitalize the role of this garden and other gardens in the city of Setif?
