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From planning to practice: How users adapt recreational spaces in Zouaghi urban park, Constantine (Algeria)

Imene Diaf 💿

Faculty of Earth Sciences, Geography and Regional Planning, University of Constantine 1, BP 325, Route Ain EL Bey, 25000/ Constantine, Algeria – <u>diaf_imene@umc.edu.dz</u>

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Abstract: Urban planning policies increasingly recognize the importance of green spaces in enhancing the quality of life for city dwellers. However, actual uses and perceptions of these spaces by residents are often overlooked. This study examines recreational practices in Zouaghi Urban Park, Constantine, Algeria, through direct observations and surveys with park users. The findings reveal a paradox: while the park's design aligns with official landscaping objectives, its actual use diverges significantly. For instance, spaces intended for passive relaxation are frequently repurposed for informal sports activities and social gatherings, particularly by residents from low-income neighborhoods. These alternative uses highlight a mismatch between planning intentions and community needs. The study underscores the necessity of integrating social demand into urban planning to ensure a better alignment between public policies and real-life recreational practices, ultimately fostering more inclusive and functional urban green spaces.

1. Introduction

For decades, the role of nature in urban environments has been a subject of significant interest in scientific literature, particularly in relation to urban vegetation and green spaces (Diane, 2000; Florgård, 2007; Weber & Trojan, 2018). Researchers have explored the complex relationship between cities and nature, emphasizing its protection, restoration, and both ecological and social significance (Long & Tonini, 2012; Shamsipour et al., 2024). The concept of the urban ecosystem has emerged as a central element in urban design, influencing architects and urban planners (Arrif et al., 2011; Shamsipour et al., 2024). However, cities have often been perceived as hostile environments for nature, with urban spaces frequently described as "anti-nature" (Boutefeu, 2007; Bibri et al., 2024). This perception has evolved in recent decades as urban green spaces are increasingly recognized not merely as social amenities, but as vital ecosystems contributing to the ecological balance of cities (Mehdi et al., 2012; Semeraro et al., 2021). This shift has given rise to the concept of ecological urbanism, which emphasizes integrating nature into urban planning to enhance the well-being of city dwellers and improve the quality of urban life (Florgård, 2007; Mansur et al., 2022). Green spaces have thus become essential components of urban design policies, addressing both environmental and social challenges (Bekessy et al., 2012; Bourdeau-Lepage & Wiesztort, 2017; Zhang & Qian, 2024). Despite the growing recognition of the benefits of urban green spaces, few studies focus on how these spaces are actually used by residents, particularly in rapidly urbanizing cities of North Africa. While extensive research has documented their ecological and social advantages, less attention has been given to how residents adapt these spaces to meet their immediate needs, especially when urban planning policies fail to align with local realities.

In cities like Constantine, Algeria, rapid urbanization since the 1980s has led to challenges such as limited green spaces, overcrowding, and inadequate recreational infrastructure (Foura & Foura, 2005; Diaf et al., 2023). Consequently, residents have developed spontaneous and informal recreational practices that often diverge from the original intentions of urban planners (Lakehal, 2014). A central focus of this research is Zouaghi Slimane Park, a public green space that serves as a recreational area for the local community. The park is centered around a large fountain, which contributes to the aesthetic appeal of the neighborhood and was part of the city's urban renewal projects following Constantine's designation as the Capital of Arab Culture in 2015. As part of these efforts, several fountains were built across the city to enhance its image and create symbolic landmarks. However, in the absence of adequate supervision, the fountain in Zouaghi Slimane Park has been repurposed as an unauthorized swimming area, raising critical urban planning concerns.

This shift in use prompts key research questions:

- Does this transformation indicate a lack of accessible leisure spaces in Constantine?
- Or does it reflect broader issues in urban culture, governance, and public space management?

By investigating the disconnect between planned urban projects and their real-life appropriation by local populations, this study aims to assess whether the needs of Constantine's residents are being adequately addressed in urban planning strategies.

2. Study area: The city of Constantine, 3rd Algerian Urban cities

This case study examines the city of Constantine, the third-largest urban center in Algeria, where natural topography has significantly influenced urban expansion and infrastructure development. The city is built on a plateau that slopes toward a valley, characterized by a complex and rugged landscape of slopes, escarpments, plateaus, hills, valleys, and wadis (Raymond, 1987; Belguidoum, 2021). Additionally, it is surrounded on three sides by a deep ravine through which the Rhummel River flows, further constraining urban growth. Despite these challenges, social and economic facilities, urban expansions, and various infrastructures have been constructed indiscriminately across the rocky terrain, often disregarding the natural environment (Cattedra, 2010; Diaf et al., 2019; Pech & Diaf, 2022). The topographical constraints within a confined space have led to numerous urban planning challenges, making Constantine a valuable case for studying land use, urban resilience, and sustainable development in complex geographic settings.

Within this context, the study focuses on a specific urban unit within Constantine: the Sonatiba neighborhood in the Commune of Zouaghi Slimane. Located on the southern outskirts of the city, this neighborhood lies along Constantine's primary urbanization axis and occupies the northern part of the Ain el Bey Plateau (Figure 1). This strategic location connects the city to critical infrastructures, including the international airport, the university, and the new town of Ali Mendjeli, as well as other southern communes in the province. The availability of land suitable for urbanization makes this area a key zone for development, emphasizing the crucial role of land as a determinant of local urbanization policies in Algeria (Naidja, 2017).



Figure 1 | Localisation of Zouaghi urban park

3. Methods and data section

This study employs a descriptive approach to analyze the use of public spaces in Constantine, focusing on Zouaghi Slimane Park and its fountain. The research combines survey and observational data to examine residents' interactions with the park and their appropriation of the fountain, particularly for swimming, despite its original aesthetic and recreational purpose. The study integrates two primary data collection methods: structured surveys and systematic observations. The surveys were designed to capture demographic information, motivations for using the fountain for swimming, and perceptions regarding the park's design and the fountain's role. Data were collected from two groups: children and families, totaling 50 children and 25 families. The sample size, while limited, is consistent with exploratory research aimed at identifying initial patterns of behavior. Previous studies examining public space use in similar contexts have employed comparable sample sizes, validating the approach in this study.

A summary of the survey questions is presented in the table below. The sample was selected to ensure diversity in terms of age, gender, and socioeconomic background. While the sample size is relatively small, it aligns with exploratory research standards and is comparable to similar urban studies focusing on behavioral patterns in public spaces.

Category	Questions
Children/Adults	
1.1	How old are you?
1.2	Where do you come from?
1.3	Whom did you come with?
1.4	Why did you come to the park?
1.5	Why do you swim in the fountain?
1.6	Since when have you been coming to the fountain to swim?
1.7	Does your family know you come here to swim?
1.8	What is the profession of your parents?
1.9	Is there a water shortage at your house, or is it just because it is hot?
Families	
2.1	Do you like the urban park, its organization, and the presence of fountains?
2.2	Do you think the fountain enhances the town's appearance?
2.3	Do you believe that swimming in the fountain harms it or pollutes the water?

Table 1	Survey	Questions
	Burvey	Questions

As the research involved children, parental consent was obtained before survey participation. Respondents were informed about the voluntary nature of the study and assured of anonymity and confidentiality in data handling. Structured observations were conducted from June 15 to July 15, 2022, during various times of the day and on both weekdays and weekends. The observations focused on counting users engaged in swimming or other activities, demographic characteristics (age, gender, group composition), behavioral patterns, and environmental conditions such as weather and temperature.

Both quantitative and qualitative data were analyzed using Microsoft Excel (Version 16.0). Quantitative data, such as demographic characteristics and frequency of fountain use, were analyzed using descriptive statistics, including frequency counts and percentages. Qualitative data from openended responses were coded thematically, focusing on patterns related to motivations and perceptions. Qualitative data from open-ended responses were analyzed using a deductive thematic analysis approach. This method involved applying a predefined coding framework informed by established theories on public space utilization and urban behavior. Specifically, the analysis focused on themes such as 'motivations for fountain use,' 'perceptions of park design,' and 'social interactions within the park.' By employing this theory-driven approach, the study systematically examined how residents' behaviors and perceptions aligned with existing theoretical constructs, enhancing the methodological rigor and facilitating comparability with prior research. The coding process involved identifying recurring themes and categorizing responses accordingly. This dual approach allowed for an integrated understanding of how and why residents use the fountain as a recreational space.

Moreover, the research combines a review of urban planning literature with field investigations, including surveys and structured observations, to understand the intentions behind public space design and the ways in which residents appropriate these spaces. The second phase of the study involved a comprehensive review of urban planning projects and public space designs in Constantine. Then the analysis of Urban Planning Documents Official plans and reports related to the development public spaces in the city. The goal of this analysis was to identify the intentions behind the design of public spaces, particularly those intended for leisure, and to assess how these intentions align with the actual use of these spaces by residents.

4. Results

4.1. Unregulated Use of Public Spaces

The significant deficiency of dedicated leisure and recreational spaces in Constantine has led to the unintended repurposing of public fountains, particularly the Zouaghi Slimane Park fountain, into informal swimming pools. This phenomenon, driven primarily by children and adolescents, reflects a disconnect between urban planning objectives and resident needs. Our investigation revealed that 85% of fountain users are children aged 10–15, predominantly from the nearby neighborhoods of Zouaghi and Sonatiba, as well as the commune of Ali Mendjeli (12 km away). Since the park's inauguration in 2015, the fountain has become a focal point for recreation, with 73% of children visiting solely to swim or take photos, bypassing other park amenities.

Visitation peaks around midday, with children spending 1–2 hours at the fountain, often unsupervised. A smaller subset (minority) accompanies family members in the afternoon, typically visiting twice weekly. However, the COVID-19 pandemic (2019–2022) significantly reduced fountain use due to

public health restrictions. By summer 2022, visitation remained subdued compared to pre-pandemic levels (2016–2019), suggesting lingering behavioral shifts or increased awareness of risks.



Figure 2 | Analysis of the answers for the reasons of frequentation of the fountain of the park Zouaghi Slimane

Analysis of survey responses (Fig. 2) identified three interrelated factors driving this behavior:

- Climate Conditions: Constantine's semi-arid climate, marked by extreme summer heat, compels residents to seek informal cooling solutions.
- Lack of Leisure Infrastructure: Limited access to public pools, parks, or recreational facilities exacerbates reliance on fountains.
- Socioeconomic Constraints: Families with parents employed in lower-income professions (e.g., public administration) often lack resources for alternative leisure activities (e.g., beach outings).

Notably, 63% of parents were unaware their children frequented the fountain for swimming, highlighting gaps in parental oversight and community communication. The misuse of fountains poses dual challenges. Unsupervised swimming in untreated water has led to reported cases of skin infections and waterborne illnesses. In other way, the phenomenon undermines the intended aesthetic and cultural goals of urban planning projects, projecting an image of neglect.

The data underscore a critical misalignment between urban design intentions and resident behavior. While environmental and socioeconomic factors (heat, limited infrastructure, income levels) explain the motivations behind fountain misuse, they do not justify the normalization of such practices. The absence of parental awareness and institutional oversight further perpetuates risks to public health and urban cohesion.

4.2. Family Perceptions of Fountain Misuse in Urban Public Spaces

A comparative analysis of survey responses from families and children reveals stark contrasts in perceptions of fountain misuse. While 85% of families condemn the transformation of the fountain into an informal swimming pool, citing dangers such as waterborne diseases (e.g., typhoid, cholera) and accidents, they also acknowledge systemic drivers behind the phenomenon. Families attribute recurring misuse to lax parental oversight, with many parents unaware of their children's activities at the fountain (63% of surveyed parents). The results in Fig. 3 below.



Figure 3 | Factors influencing park attendance by families and children

Some families contextualize the behavior, noting that extreme summer temperatures (averaging 35–40°C) and limited access to coastal leisure options (e.g., beaches) leave children with few alternatives. Despite appreciating the park's design and recreational value, families highlighted dangerous accessibility to park. The park's proximity to National Road 79 and the East-West Highway forces

children from distant neighborhoods (e.g., Ali Mendjeli) to cross high-speed thoroughfares, resulting in fatal accidents.

The persistence of fountain misuse reflects deeper systemic and cultural challenges. Authorities have failed to address safety hazards (e.g., unsafe crossings) or enforce regulations, despite the phenomenon's recurrence since 2016. A lack of collective responsibility for public spaces perpetuates neglect. As one parent noted, "Public facilities are seen as nobody's property, so nobody feels compelled to protect them." Children, unaware of health risks, prioritize immediate recreation. As reported in El Nasr (2017): "by midday, we have noticed a large number of children gathered in the fountain in swim wears and racing among themselves while others were lying on fountain grass next to their stuff, towels, and sunglasses as if it were a real beach. In addition to that, the access to the park is really dangerous and recorded many deadly accidents of people of different ages including the children who comes for swimming because they have to cross the national road 79 or the highway to reach the park if they come from other neighbourhoods (the new town Ali Mendjeli). Moreover, the fountain water has a green colour due to its pollution. Children risk of being infected by the contagious and deadly diseases like the typhoid and the cholera resulting from swimming in the fountain waters". The phenomenon underscores a misalignment between urban design and community needs. The lack of safe, supervised recreational spaces (e.g., public pools) exacerbates reliance on ill-suited alternatives like fountains. The misuse of Zouaghi Slimane Park's fountain is not merely a behavioral issue but a symptom of institutional neglect and cultural ambivalence toward public spaces. While families recognize the dangers, their responses highlight a fragmented accountability framework: Parents blame authorities for inadequate safety measures and authorities overlook the need for participatory planning and maintenance.

5. Discussion

5.1.What modes of appropriation of the public spaces are used by the city-dwellers? Experimenting in public spaces

The public space in Constantine does not deviate from the general trends observed in other Algerian cities. The town faces a significant shortage of rest and relaxation areas, as well as playgrounds for children. Green spaces dedicated to social and recreational purposes are insufficient. Benkouachi and Alatou (2017) highlights a striking deficiency in green spaces, with a ratio of 0.53 m² per inhabitant,

far below the national standard of 4 m² per inhabitant and the WHO recommendation of 10 m² per inhabitant. Neither publicly managed green spaces nor natural spaces accessible to all city dwellers are adequately considered, and isolated vegetation is often removed.

For example, in the new town of Ali Mendjeli, part of the Constantine agglomeration, rest areas are scarce. In response, alternative social spaces have emerged. Coffee shops have become primary venues for sociability and leisure, catering almost exclusively to male customers, including retirees, the elderly, and unemployed youth (Lekhal, 2017). These spaces provide an opportunity for residents to engage with their urban environment in their own way. In contrast, as in many Arab-Muslim cities, women predominantly frequent commercial spaces. The El Ritadj Mall, soon after its opening, became an essential gathering place not only for Ali Mendjeli residents but also for the broader Constantine community. Beyond its commercial function, the mall fosters forms of sociability, particularly for women, who often visit with family members or friends for leisure rather than shopping (Harroud, 2009; Lekhal, 2017). Investigations by Lekhal (2017) confirm that women, regardless of age or socioeconomic status, frequently use malls as spaces for social interaction, appreciating the opportunity to meet people and establish relationships in a setting that also offers symbolic prestige.

5.2. Constantine and the urban improvement programmes. What are the urban issues?

Algeria's housing crisis and rapid population growth have accelerated urbanization, often at the expense of well-planned public spaces (Riadh & Osman, 2021; Diaf et al., 2023). This has led to deteriorating living conditions in many cities, prompting authorities to launch extensive urban development programs. Constantine, as a major metropolis in eastern Algeria, faces significant challenges, including under-equipped neighborhoods, poor-quality public services, and a lack of well-designed public spaces. In response, the government has initiated large-scale projects aimed at sustainable urban development (Mouhoubi & Boudemagh, 2017). These initiatives focus on sanitation, street lighting, esplanades, green spaces, recreational areas, and improved infrastructure (Zahi, 2011)

Constantine has benefited from several ambitious urban planning projects. These projects were selected based on their alignment with national and regional strategic plans, such as The Master Plan of Metropolitan Station Planning (MPMSP), established under Law No. 01-20 of December 12, 2001, which aims to control urban growth and promote sustainable development (Guerni, 2008; Aliouche

et al., 2017). It builds on the National Plan of Territory Planning (NPTP) and the Regional Planning Plan (RPP) for the Northwest region, with a vision extending to 2025. The MPMSP seeks to optimize the influence of the metropolis on its urban station, ensuring the development of infrastructure networks, competitive and complementary town networks, and collaborative networks of actors and companies to foster a pole of competitiveness and expertise.

Another key initiative, the Urban Coherence Plan (UCP), aligns with sustainable development principles and focuses on job creation, economic development, improved quality of life, urban and architectural quality, environmental protection, and the enhancement of the city's image (MATET, 2006–2007). Additionally, the Modernisation Plan of the Constantine Metropolis (MPCM), launched in 2007, operates on short-term (2 years), medium-term (5 years), and long-term (10 years) timelines. The MPCM aims to modernize the city, improve living conditions, and enhance the metropolis's image through spatial and territorial revalorization. The designation of Constantine as the Capital of Arab Culture in 2015 further contributed to the city's development, serving as a cultural and territorial communication strategy that promoted local development and projected a positive image nationally and internationally (Zahi, 2011; Messali, 2016). These projects reflect a participatory approach to urban planning, aiming to reduce spatial imbalances and promote modernization and metropolization (Mouhoubi & Boudemagh, 2017; Naidja, 2017). They underscore the Algerian government's commitment to transform major cities like Constantine into organized, sustainable metropolises. Through these efforts, Constantine has made significant progress in reshaping its urban landscape and advancing its image as a modern metropolis (Mouhoubi & Boudemagh, 2017).

5.3. What about after these projects?

The actual context clearly illustrates the diversity of functions that fills the parks and gardens according to the city-dwellers and thus the sensed needs of research about the links between the urban ecosystem and the welfare of individuals in urban environment (Tzoulas et al., 2007; Arrif et al., 2011). Authors, like Bourdeau-Lepage & Wiesztort (2017) and He & Chen (2024) underline that "the desire of urban nature is not new, but today, the desire of nature in everyday life as an element of individual happiness is omnipresent in our societies which became urban". In parallel Clergeau (2012) finds that "the analysis of eco systematic services that might render these spaces [...] is a good mean to justify in a very concrete manner the interest of the preservation of a Nature in the town". It is without a doubt that the city-dwellers fetch more nature spaces in town. This means that these green

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spaces have become a synonym of urban life quality (Decelle et al., 2007; Petrovič & Murgaš, 2021). This social demand has generated new management practices and different typologies of green spaces in town. Nature might have many forms in town, green spaces, parks, and public gardens (Arnould et al., 2011; Petrovič & Murgaš, 2021; Farkas et al., 2023). Green spaces are areas of relaxation and recreation treasured by the city-dwellers as well as areas of tranquillity, socialisation, and leisure. City-dwellers calls for nature in town, but the required qualities for these spaces are calmness and cleanliness (Gibout, 2009; Arnould et al., 2011; Robert, 2015; He & Chen, 2024).

In a world where urbanisation is intensifying and especially in its extension to the outskirts, this progress tends to strongly change the landscapes and the lifestyles in these zones. The improvement of life quality thanks to green spaces in the town is now a recognised idea. The research and the actual context on the subject clearly illustrate the progress and the sensed needs of research about the links between the ecosystems and the welfare of city-dwellers in the urban environment (Izakovičová, 2017; Robert & Yengué, 2018; Farkas et al., 2024).

Since 2001, Algeria has launched many projects of urban improvement that are part of the framework of a national ambitious programme of support for economic resurgence and sustainable development objectives. Nevertheless, urban planning projects must not be limited to facilities and infrastructures of public services. They must be linked to the economic and social development model for which the country engages and answers different needs of city-dwellers. Unfortunately, the majority of urban projects initiated in the town of Constantine have given a secondary place to leisure spaces and green spaces in the town. It seems quite normal that, for a developing country with limited financial means, the authorities give the priority to large economic projects, for example public transport, universities, or business centres. The planning of a leisure and relaxation space responds, however, to economic and social needs (Manusset, 2012). It is prerequisite that the state, the public authorities, and the local authorities give equal importance to the needs of socio-spatial practices including recreative ones of city-dwellers as well as to gestures and acts of architects and urbanists (Lekhal, 2014; Mili, 2019). For this reason, the lack of leisure and relaxation spaces in the town has led city-dwellers to divert the uses of public spaces to be able to conduct leisure activities in spaces acting as sociability environment in the public space. City-dwellers also do this when they arrange informal meetings outside houses to practice a leisure notably for the youngsters (football, other games). Unfortunately, these public spaces in the town are not planned for families who need to gather during the evening hours. In the same way as other activities performed in the public space, the recurrence of nonauthorised swimming in the fountains creates a negative image of places and provokes the exasperation of other users. Education in the respect of the public space must raise the parental education up, but it is made the flaw actually (Mollard et al., 2014; Pukowiec-Kurda, 2022).

The findings of this study contribute to planning theory and practice by illustrating the importance of integrating community behaviors and informal uses into public space planning. The observed appropriation of the fountain for swimming, particularly by children, reflects a disconnect between the original design intentions and the lived realities of users. This underlines the value of participatory planning processes that actively involve local residents in design and decision-making, ensuring that public spaces meet actual needs and aspirations. Furthermore, the case points to the relevance of adaptive planning approaches that can accommodate unplanned uses and reinterpret rigid design frameworks. Recognizing such informal dynamics enables planners to develop more inclusive and resilient urban strategies.

6. Conclusion

This study highlights the challenges and opportunities of urban planning in Constantine, emphasizing the need for sustainable and participatory approaches. While infrastructure improvements have been made, gaps remain in addressing city-dwellers' aspirations and integrating nature into urban spaces. However, the study has limitations, notably the reliance on qualitative observation methods, which, while insightful, limit generalizability. Additionally, the sample size may not fully capture the diversity of urban experiences across the city. Future research could incorporate mixed methods to strengthen findings.

To improve urban planning, authorities should prioritize the creation of green spaces and recreational areas to enhance quality of life (Choumert & Salanié, 2011; Delabarre & Marry, 2012; Beaurain, 2015). Adopt participatory planning strategies that reflect local needs; implement adaptive policies beyond bureaucratic constraints to address evolving urban challenges (Lakehal, 2014; Robert & Yengué, 2018; Gasquet-Blanchard et al., 2020); and balance rapid urbanization with ecological sustainability, drawing lessons from successful models such as Singapore and Copenhagen. By integrating ecological and social dimensions into urban policies, Constantine and similar cities can transition toward resilient, inclusive, and liveable urban environments that better meet the needs of their inhabitants (Harms, 2024). The experiences of Singapore and Copenhagen offer valuable lessons in participatory and adaptive urban planning. Singapore's Urban Redevelopment Authority (URA) has institutionalized public engagement through initiatives like the Draft Master Plan 2013, which involved extensive public consultations, exhibitions, and online platforms, allowing citizens to contribute to land use planning decisions. This approach has facilitated the development of inclusive

urban spaces that reflect the needs and aspirations of its residents. In contrast, Copenhagen has transformed its urban landscape by prioritizing community involvement in projects such as the Superkilen park in the Nørrebro district. This project incorporated elements suggested by local residents, fostering a sense of ownership and cultural representation. These examples contrast with the situation in Constantine, where the lack of participatory planning has led to the informal appropriation of public spaces, such as the use of the fountain in Zouaghi Slimane Park for swimming. By adopting participatory and adaptive planning strategies, urban planners in Constantine can better align public spaces with community needs, enhancing their functionality and sustainability (Bouadam, 2024).

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