Study of Some Environmental, Cultural and Universal design factor in Iraq's public parks: A Comparative Study of Erbil, Baghdad, and Basra

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Abstract

This study examines the influence of some environmental, cultural and universal design factors on the design and use of public parks in three major Iraqi cities: Erbil, Baghdad, and Basra. A mixed-method approach was adopted using Three way to data collection questionnaire, Telephone interviews, and site documents. A total of 177 respondents participated in the questionnaire. Data were analyzed by SPSS and using frequencies, percentages, chi-square tests, and thematic analysis of open-ended responses. Generally, findings indicate that public parks in Iraq are primarily used for family gatherings (42.4%) and relaxation (39.4%), together accounting for 81.8% of the reported purposes of visits. Afternoon visits were the most common (52.5%), highlighting the importance of thermal comfort and shade in park design. Overall, 57.1% of respondents agreed that summer shade was adequate, Plant suitability received a relatively positive assessment, with 68.9% agreeing that plant species were appropriate for local climatic and soil conditions. Cultural identity was also identified as important areas requiring further development, especially by Kurds in northern of Iraq they wanted and recommended to more focus on developing the cultural aspect in their park. The comparison among the three study sites revealed clear differences. Erbil generally recorded the most positive perceptions, while Basra showed the greatest challenges related to thermal stress, vegetation. Baghdad generally occupied an intermediate position but performed relatively well regarding open cultural and social spaces. Environmentally, Erbil performs best overall, with the highest agreement for sufficient summer shade (61.54%) and plant suitability (73.08%). Baghdad demonstrates relatively good environmental performance, particularly in plant suitability (69.05%). In contrast, Basra records the lowest agreement for both indicators, especially plant suitability (51.28%), reflecting potential challenges associated with its hotter climate. Also, Erbil has the strongest perception of cultural representation (53.85%), while Basra has weaker, Baghdad scores relatively well in terms of social and cultural spaces (59.52%) and Perceptions of accessibility in Erbil are significantly better (69.23%) compare to Baghdad and Basra. In terms of universal design with 69.23% of respondents believing that paths accommodate all users, including older persons and people with disabilities, Erbil exhibits the highest level of

pathway accessibility. 42.86% of respondents in Baghdad agreed, while 47.62% thought accessibility was just partially adequate. With only 30.77% agreement and 53.85% claiming partial accessibility, Basra performed the worst.

Keywords: Public Parks; Landscape Design; environment: Thermal Comfort; shading; Cultural Identity; Accessibility, Universal design.

1. Introduction

Every city's overall growth and development depend significantly on public parks, by regulating the microclimate [1] . Especially, in arid and semi-arid areas such as Iraq, public parks achieve an even more important environmental role, because it has a diverse variety of geomorphological features, from mountains to deserts, the researchers should take into account the physiographic aspects in various locations of the country [2]. The most important environmental factors consist of the types of plant suitable for soil condition for their region, as well as using various plant typing for shading in various cities of country [3], [4] . plant suitability for climate and soil condition and using possible plant for shading reduce urban heat effects, conserve water resources and improve thermal comfort, although carefully designed landscapes it exhibits considerable some environmental and cultural difference between its northern, central, and southern regions, due to this reasons park design should respond to local environmental conditions and public preferences rather than applying a uniform design approach, one of factors that led to the decline the role of parks in Iraqi society are administrative neglect and poor organization, along with poor planning and design [5] Additionally, these thoughts will help develop a model that can address the exact needs of residents in different urban areas instead of using the same generic method. The reason behind this proposal is that the development of the park should be a dual-use exercise that takes into account the environment of a particular area and the cultural needs of the local people but the same comprehensive design for the needs of young, elderly and disabled [6] .On the other hand, public park design can act as a tangible manifestation of societal values, where botanical choices and park design elements are deeply reflected to the history and culture of community. These design paradigms effectively function as an interface for transferring collective identity and meaning to subsequent generations, transforming physical space into a symbolic repository of heritage [7]. By investigating these design elements through a semiotic lens, researchers can uncover how physical structures—such as water channels or botanical arrangements—function as complex symbols reflect cultural ideologies [8]. Due to Iraq's remarkable ethnolinguistic and religious diversity across its northern, central, and southern regions, significant differences exist in the design approaches of public parks. Consequently, this study evaluates the extent to which these parks satisfy local cultural needs, assesses how effectively they reflect regional cultural identity, and analyses the importance of

cultural spaces in the park design process beside of unsure that public parks are accessible to all users particularly those with disability and elderly. The aim of this study is to evaluate some of the environmental, cultural and inclusive design responses of public park designs to their local environment and cultural sites for all sections of society. Furthermore, it assesses user satisfaction regarding these designs based on a comparative analysis of survey responses collected from respondents for Sami Abdul Rahman Park in Erbil, Al Zawra Park in Baghdad and Family Park in Basra. Consequently, see how different local context features, such as urban landscapes, relate to specific interventions in the environmental field while incorporating cultural practices [9], [10] And on this regional basis, the conceptual framework of this research is established.

2. Material and method

The use of mixed methodology offers a useful technique to research that is ideal for examining individuals and their perspectives [11] . This study used a mixed-methods approach to investigate the influence of certain environmental, cultural, and universal design factors on public park design by comparing the parks in the study site with each other. The study collected quantitative and qualitative data during the study period. The study started by collecting quantitative data from the questionnaire process to generalize the results to the population where the questionnaire was the main way to get answers from visitors and residents living in those cities using questionnaires, also, using SPSS Program for analysing data and using frequencies, percentages, chi-square tests, and thematic analysis for open-ended responses. In addition, telephone interviews with higher education landscape design expert to give their opinion about the design of their city public park, and analysis of study sites documents to understand and gather information about the environment and culture of each study site. Combining these three methods can yield a comprehensive assessment of how certain environmental and cultural factors affect public park design in Iraq or which public park design in which part of Iraq is more reflective of local culture and local microclimate regulation.

2.1 Study area

Three parks in different geographical area at north, central and south part of Iraq were selected for investigating effect some environmental, cultural and universal design factor effect on public park design, the first site is Sami Abdulrahman Park in Erbil province at north, the second one is Al-Zwara park in Baghdad province at central and third site is Family Park in Basra province at south as show in Fig (1).

2.1.1 Sami Abdul Rahman Park.

The biggest and greenest park in Kurdistan Region, situated at the West side of Erbil that capital of Kurdistan Region and is the largest city in northern Iraq located in 36.2oN Latitude, 44.0oE t It is located approximately 350 kilometres north of Baghdad.

2.1.2 Al-Zwara Park

is located on the Karkh side of Baghdad in the central part of Iraq between latitudes 33.452° and 33.184° N, longitudes 44.189° and 44.576° E It has an area of about

133.86 ha (16.6025 ha is the area of the lake), (Baghdad latitude).

2.1.3 Family Park

is popular recreational outdoor space in Basra southern Iraq, featuring amusement rides, family seating area, and waterfront activities located on dinar street in the AL-Maqal area. The latitude of Basrah, Iraq is approximately 30.5° North (specifically 30.5081° N). It sits at a longitude of 47.7835° East in the southernmost part of the country along the Shatt al-Arab waterway.

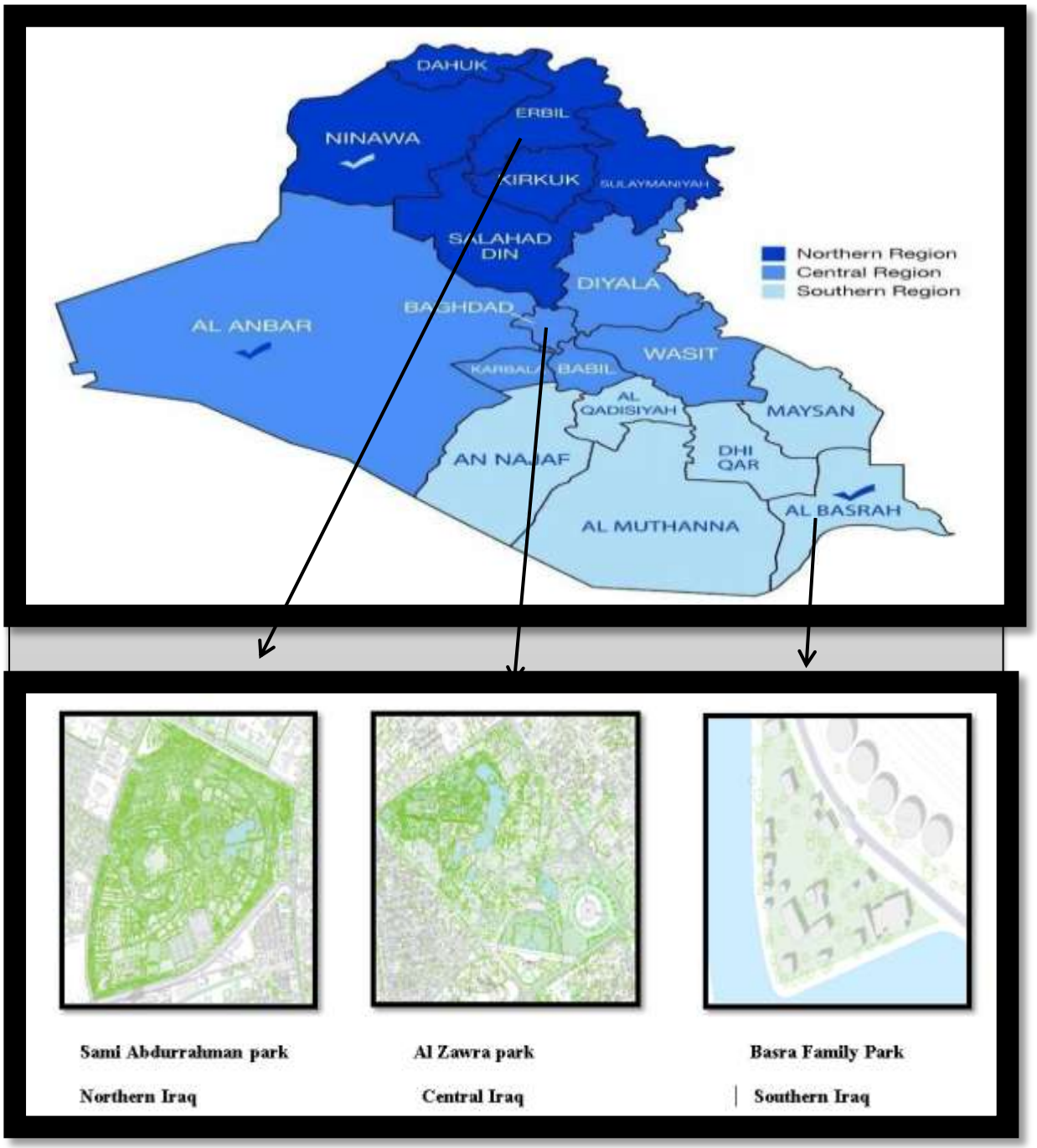


Figure (1) Study Sites [12]

2.2 Data collection

The study collected set-accurate information about the study site area's environment and culture from Feb 5th, 2026, to July on the 20th, 2026, by using three methods of data collection, it achieved some important information through telephone interview, site documentation, and questionnaires with Iraqi community members in different environments and cultures of country.

2.2.1 Interview

In this study, the researchers called with several garden design experts from different universities like Diyala, Tikrit, Baghdad, and Basra to get information about some environmental and cultural factors that affect park design in the areas where they live.

2.2.2 sites documents

In this study, site document method was improved to obtain the necessary qualitative data. Within the framework of the site document method, we collected most important environmental and cultural information on the different locations of the study in different geographical areas of Iraq. Among the many studies on the Iraqi environment and culture, special attention was paid to those that broadly covered the objectives of the study and included the variables planned.

2.3 Some Environmental factor of the sites

Iraq is located between geographic coordinates 33 00 N, 44 00 E. Iraq is located between two regions that are different in their terrain and similar in their lack of natural resources. In the north and the east, there are plateaus and semi-barren mountains. In the west and south, there are desolate deserts and land poor in agriculture and water resources, unlike Mesopotamia, which has abundant water resources, and arable land. Iraq can be separated into four areas based on the topography of the country (Mountain Region that Erbil refer to this region, Plateau and Hills Regions, The Mesopotamian plain also Baghdad at central and Basra at southern refer to this region and Jazera and Western Plateau). The climate is primarily of continental, subtropical semi-arid category [13]

2.3.1 Climate

Erbil The mountainous area to the north and the Mesopotamian plain to the south border this area. The Erbil plain has a semi-arid climate with hot summers and chilly winters, this area has two different climates: from April to the end of September, it is dry and hot, and from October to March, it is damp and chilly [14] . As show in (Table 1). While Baghdad This area is restricted between the main two Rivers, Euphrates and Tigris. It makes up 20% of Iraq's total land area. The region experiences very little rain in the summer (June–August), very little in September, and wet months from October to May. Rainfall affects the moisture content of the soil. The research area's average yearly rainfall was 260.86 mm. January had the greatest monthly average relative humidity (75.12%), while July had the lowest (23.93%). The highest monthly average appeared in July (36.13°C), while the lowest appeared in January (10.1°C) [15] . As show in (Table 2). On the other hand, Basrah is bounded by the Tigris and

Euphrates, the two major rivers. It makes up 20% of Iraq's total land area. In Basrah, the highest Temperature is 46-40°C (July), the lowest Temperature is 13°C (January), Relative Humidity (%) is highest during the cooler months and drops significantly during the hot summer months, highest Humidity 57% (December and January) lowest Humidity 14% (June) as show in (Table 3) [16] .

Table 1. The climate data recorded in Erbil station for the periods (1995-2020)

Month	Windspeed m/s	Sunshine hr./day	Rainfall mm	Relative Humidity%	Evaporation (mm)	Avg. Temp Ċ
Oct	1.92	7.86	18.61	42.18	194.18	21.09
Nov	1.71	6.50	36.92	57.72	94.73	13.50
Dec	1.83	5.19	67.63	67.70	56.22	8.47
Jan	1.97	4.91	74.27	72.39	50.70	6.95
Feb	2.20	5.81	63.13	67.23	68.45	8.20
Mar	2.37	6.57	70.88	60.69	120.09	11.97
Apr	2.36	7.49	45.68	54.30	162.71	16.78
May	2.36	9.31	13.27	38.90	280.16	22.76
Jun	2.23	11.52	1.62	27.59	371.26	28.53
Jul	2.08	11.66	0.20	25.71	419.11	31.57
Aug	1.84	11.21	0.04	27.62	297.82	31.02
Sep	1.71	10.12	2.41	31.75	292.10	26.40
Sum	24.60	98.15	394.65	573.79	2407.53	227.24
Avg.	2.05	8.18	32.89	47.82	200.63	18.94

Source: [14]

Table 2. Monthly averages of the climatic elements for the years 1981 to 2019 in Baghdad

Months	Sunshine (h/day)	Temperature (C^o)	Wind speed (m/sec)	Evaporation (mm)	Relative Humidity (%)	Rainfall (mm)
Oct.	7.21	25.77	1.77	231.49	37.43	14.73
Nov.	6.94	17.33	1.54	113.52	58.17	42.92
Dec.	6.69	12.15	1.48	75.39	72.10	41.66
Jan.	5.21	10.10	1.63	66.27	75.12	43.92
Feb.	6.67	11.97	1.92	99.03	67.71	35.31
Mar.	7.95	15.96	2.08	174.86	60.07	37.99
Apr.	9.27	21.63	2.30	244.98	50.47	29.40
May.	10.53	28.60	2.17	346.28	36.11	11.25
Jun.	10.06	33.31	2.15	456.29	25.91	0.84
Jul.	11.33	36.13	1.94	510.50	23.93	0.50
Aug.	10.77	35.79	1.73	458.02	24.74	0.64
Sep.	7.99	31.60	1.58	342.96	27.99	1.71
Average	8.39	23.36	1.86		46.65	
Total				3119.59		260.86

Source: [15]

Table 3. Monthly averages of the climatic data s for the years 2010 to 2020 in Basra

Months	Rainfall (mm)	Temperatu re (°C)	Relative Humidity (%)	Wind Speed(m/s)	Sunshine duration (h/d)	Potential Evapotrans piration (mm)
Oct	4.07	29	28	3.83	9	73
Nov	18.5	20	48	3.58	8	38
Dec	16.2	14	57	3.90	7	22
Jan	7.70	13	57	4.06	7	12
Feb	9.39	15	50	4.28	8	19
Mar	3.29	20	40	4.41	8	28
Apr	7.02	27	31	4.30	9	61
May	1.22	33	22	4.60	10	143
June	0.81	38	14	6.26	12	203
July	1.38	45	15	5.67	11	147
Aug	0.82	39	16	4.72	11	223
Sept	0	35	17	4.56	10	148

Source: [16]

2.3.2 Topography and water source

The topography of the Erbil is relatively flat, with the highest elevation point reaching around 412 m above sea level [17] . The area proper is suitable only for grazing in the foothills and steppes; adequate soil and rainfall, however, make cultivation possible. But Baghdad and Basra are characterized by its very gentle slope from the north towards the south. The average annual rainfall is of the order of 250mm. The agricultural activities depend on irrigation canals from the Tigris and Euphrates [18] .

2.3.3 Wind

Because of the high pressure in the Turkish highlands and the low pressure in the Arabian Gulf region, the winds are north-westerly and blow over Iraq in the summer. In the winter, cold winds from the east and northeast combine with Mediterranean-laden rain [19] The south of Iraq has seen an increase in wind speed. This is due to the fact that the southern portion of Iraq often has a flatter terrain than the rest of the country. Some notable places, like Basrah, have high wind speeds. The average wind speed in these locations is more than 3 m/s, and during the summer, particularly in June, it can reach 5 m/s. In June, the highest wind speed recorded at the same locations was 5.9 m/s. Although Baghdad's average wind speed exceeds 3 m/s, its monthly wind speed is lower than Basrah's. The average wind speed value at each site is 3.2m/s [20] . While monthly average wind speeds ranged from 2.55m/sec to 6.29m/sec in Erbil [21] .

2.3.4 Soil Condition

Erbil's mountainous soils were ideal for orchards and crop rotation because to their low salinity (EC = 1.9 dS/m) and moderate permeability. Baghdad had a loamier texture, more balanced textures, moderate fertility, and 1.8–1.9% organic matter. However, Basrah's clay-rich soils have a much lower bulk density (1.25 g/cm³) despite being severely saline (EC = 8.0 dS/m, ESP = 45%) [22] .

2.4 Culture of the Study Sites

2.4.1 Ethnic, Religion and Language

Iraq is one of the most ethnically diverse political entities in the world, with a complex system of languages, religions, ethnic groupings, and regional identities. Its culture is based on a long history of civilisational, ethnic, religious, sectarian, and linguistic variety [23] . The intense and overlapping gaps in ethnic and religious dimensions result from the complexity and diversity of Iraq's demographic composition Also, Iraqis identify themselves as Muslims and Islam is the official religion, but three different geographical regions make up Iraq's cultural-ethnic characteristics [24] . Iraq is home to several major nations, including the Arabs, who are from the Arabian Peninsula and speak Arabic (Standard and Mesopotamian dialects) in central and southern Iraq. The majority of the population of Baghdad and Basra are Arabs and their language is Arabic, but the population of Baghdad is mostly Sunni Arabs, but the majority of the population of Basra is Shiite Arabs. Kurds are the second nation; They are native to the hilly regions of western Asia. They speak Kurdish (Sorani, Kurdish), mostly Sunni Kurds and live in northern (Erbil) Iraq [19] These differences may influence how diverse ethnic groups in Iraq observe and experience public parks, mainly regarding the extent to which landscape design reflects the cultural, religious, and linguistic identities of their respective regions.

2.2.3 Questionnaire

A research questionnaire is typically a mix of close-ended questions and open-ended questions. It consisted of a structured and unstructured questionnaire form for collecting data. Questionnaire forms are distributed online via Google Forms with residents and visitors of Sami Abdulrahman Park at Erbil, Zawra Park at Baghdad and Family Park at Basra of Iraq. The questionnaire comprised some questions and was designed to capture multidimensional aspects of public park design and some environmental, cultural and universal design effect through six interconnected sections:

Section 1: Demographics and Personal Context. This section collected foundational data, including park visits, residency, gender, age group, and education. These variables were essential for profiling diverse visitor groups and understanding the difference between visitor satisfaction patterns within the specific cultural context of different geographical areas. Where demographic factors significantly influence public park design.

Section 2: Park Usage Patterns. This section examined preferred times to park visits by visitor, which season had more frequency, and the purpose of park visits. This categorization enabled a nuanced

analysis of how different user groups engage with the park environment.

Section 3: The third section assessed overall visitors' performance with park environmental factors and identified the need for sufficient shading and how the plant species match the area's soil condition.

Section 4: In this part of the survey, we looked at the cultural sides of the park to check, if the park's historical and cultural features show the area's identity and make it a good spot for social and cultural events.

Section 5 This section includes a question about whether park trail design is inclusive and accessible to all users, including the elderly and disabled

Section 6: The last part was open feedback, where people shared their thoughts and ideas on important park design issues in their area, as well as suggestions for making parks that are better possible with the local environment and culture.

3. Results

A well-structured questionnaire served as the main foundation for the study's mixed-methodology approach. The questions addressed some environment-related, cultural and universal design aspects of the use of the three parks. The data were analysed by SPSS program and using frequency and percentage statistical indicators, and open-ended responses were categorized based on several themes to extract the most common concerns and ideas. Also provides the analysed statistical data related to respondents' demography, the parks they visited, their residence, age, and the educational level, as well as the time and season of their park visits and purposes of their visits. The information was gathered to establish differences in the perception of using parks among the respondents. After analysing the data obtained the following results for the First section and second section of questionnaire form as show in (Table 4) to (Table 11)

Table 4. Gender

Gender	Frequency	Percentage (%)	Chi-square value:
Male	98	55.40%	$\chi^2 = 2.04$
Female	79	44.60%	
Total	**177**	**100%**	

The sample included 98 male (55.40%) participants and 79 female (44.60%) participants. The Chi-square test revealed that there was no significant difference in the ratio of male and female participants: χ^2 (1) = 2.04, p = 0.153. Therefore, since p>0.05, the sample size was adequate.

Table 5. Which Park do you visit most frequently?

Park	Frequency	Percentage (%)	Chi-square value:
Sami Abdulrahman Park – Erbil	79	44.63%	
Al-Zawraa Park – Baghdad	51	28.81%	
Al-Family Park – Basra	47	26.55%	**χ^2 = 10.31**
Total	**177**	**100%**	

The highest percentage of respondents belonged to Sami Abdulrahman Park-Erbil (44.63%), followed by Al-Zawraa Park-Baghdad (28.81%), Family Park-Basra (26.55%). According to the results of the chi-square test, this distribution was significant, χ^2 (2) =10.31, p = 0.005, which implies that respondents were not equally distributed across the studied categories of parks.

Table 6. Residency Status

Place of Residence	Frequency	Percentage (%)	Chi-square value:
Resident of the city	106	59.90%	
Visitor from another city	71	40.10%	**χ^2 = 6.92**
Total	**177**	**100%**	

City residents comprised 59.90% compared to 40.10% of visitors from other cities. This outcome was found to be statistically significant, χ^2 (1) = 6.92, p = 0.009, which suggested that the data did not follow an equal percentage distribution pattern of 50%–50%.

Table 7. Age Group

Age Group	Frequency	Percentage (%)	Chi-square value:
Under 18	6	3.40%	
18–30	34	19.20%	
31–50	102	57.60%	**χ^2 = 104.38**
Above 50	35	19.80%	
Total	**177**	**100%**	

The biggest portion of respondents were aged 31-50 years (57.60%). The frequency distribution also revealed that the most frequent age groups were those above 50 (19.80%), 18-30 (19.20%), and under 18 (3.4.0%). The age distribution was not homogeneous as the Chi-square test results revealed a large significant difference χ^2 (3) = 104.38, p < 0.001.

Table 8. Educational Level

Educational Level	Number	Percentage	Chi-square value:
High School or below	23	13 %	
Bachelor's / Diploma	88	49.7%	**χ^2 = 37.05**
Postgraduate (M.Sc./Ph.D.)	66	37.3%	
Total	**177**	**100%**	

Among the respondents, 49.7% had a bachelor's or diploma, 37.3% had postgraduate degrees and 13% completed high-school education or below. The result was significant, χ^2 (2) = 37.05, $p<0.001$, which suggests that the distribution of the respondents among educational categories was not equal.

Table 9. Primary Time of Visiting the Park

Primary Time of Visit	Number	Percentage	Chi-square value:
Morning	20	11.3%	$\chi^2 = 45.42$
Afternoon	93	52.5%	
Night	64	36.2%	
Total	**177**	**100%**	

Afternoon was the most common period of time for visits (52.5%), followed by night (36.2%) and morning (11.3%.) The chi-square test revealed a highly significant difference, χ 2 (2) = 45.42, $p<0.001$. This suggests the need to create parks, which promote sufficient thermal comfort, shade, seating, and protection during afternoon periods.

Table 10. Seasonal Frequency of Park Visits

Seasonal frequency	Number	Percentage	Chi-square value:
Summer	59	33.3 %	$\chi^2 = 75.36$
Spring & Autmn	106	59.9%	
Winter	12	6.8%	
Total	**177**	**100%**	

The largest part of the respondents (59.9%) visited the park in spring and autumn, 33.3% – in summer, and 6.8% – in winter. The difference between the groups was found to be statistically significant, χ^2 (2) = 75.36, $p<0.001$. Accordingly, it can be said that the use of the park is seasonal and depends to a great extent on weather conditions, which must be taken into account when planning its use.

Table 11. Purpose of visiting parks

Purpose of Visit	Number	Percentage	Chi-square value:
Family Gathering	75	42.4%	$\chi^2 = 62.46$
Relaxation	70	39.4%	
Kids Play	13	7.3%	
Sports Walking	19	10.7%	
Total	**177**	**100%**	

Family gathering was the most common purpose for visiting the park (42.4%), followed closely by relaxation (39.4%), sports and walking (10.7%), and kids play (7.3%). The Chi-

square test revealed a highly significant difference, χ^2 (3) = 62.46, p<0. 001. This suggests that there is a significant variation in the motivations of respondents for visiting parks, with social gathering and relaxation being the main drivers

The most important results obtained in Section 3 are showed in (Table 12) and (Table 13).

Table 12. The park provides sufficient shade to protect from direct sun in summer

Shade Protection in Summer	Number	Percentage	Chi-square value:
Agree	101	57.1%	χ^2 =70.35
To some extent	65	36.7%	
Disagree	11	6.2%	
Total	**177**	**100%**	

More than half of respondents (57.1%) agreed that adequate shade was provided, while 36.70% considered shade adequate to some extent and 6.2% disagreed. The result was highly significant, χ^2 (2) =70.35, p<0.001. This indicates a clear difference in respondents' perceptions and suggests that additional shade provision is important in Iraq's hot climate.

Table 13. Suitability of Plant Species for Local Climate and Soil Conditions

Plant species are suitable for local climate and soil conditions	Frequency	Percentage (%)	Chi-square value:
Agree	122	68.9%	χ^2 = 117.22
To some extent	50	28.2%	
Disagree	5	2.8%	
Total	**177**	**100%**	

In this group, 68.9% agreed that plant species were suitable for local climate and soil conditions, 28.2% thought they were suitable to some extent while 2.8% disagreed. The result was highly significant, χ^2 (2) =117.220, p<0.001. It could be concluded that vegetation suitability varied greatly from one park or region to another.

On the influence of cultural factors that Section 4 finds these results as show in (Table 14) and (Table 15)

Table 14. landscape elements reflect local identity and historical heritage.

Architectural elements reflect local identity and historical heritage	Frequency	Percentage (%)	Chi-square value:
Agree	74	41.8%	χ^2 = 22.18
To some extent	74	41.8%	
Disagree	29	16.4%	
Total	**177**	**100%**	

In the second set of responses, 41.8% agreed, and another 41.8% considered the reflection of local identity adequate to some extent, while 16.4% disagreed. The result was significant, χ^2 (2) =22.18, p<0.001. This finding strengthens the need for a stronger integration of the local

architectural vocabulary, cultural symbols, historical references, and traditional landscape elements. Moreover, the cultural dimension of the study. The public parks should not only provide environmental comfort but also reflect the cultural identity, history, traditions, and social characteristics of their respective cities

Table 15. Open spaces are suitable for local cultural and social festivities

Open spaces are suitable for local cultural and social festivities	Frequency	Percentage (%)	Chi-square value:
Agree	99	55.9%	$\chi^2 = 54.24$
To some extent	59	33.3%	
Disagree	19	10.7%	
Total	**177**	**100%**	

More than half of the respondents (55.9%) agreed that open spaces are appropriate for cultural and social festivities, 33.3% selected "to some extent" and 10.7% disagreed. The Chi-square test was highly significant, χ^2 (2) =54.24, $p<0.001$. It confirms the important social and cultural function of public parks. It means that the cultural identity is recognized in the park design, although there is still a long way to go to strengthen the representation of culture.

In universal design factor section of questionnaire form one question answered as show in (table 16).

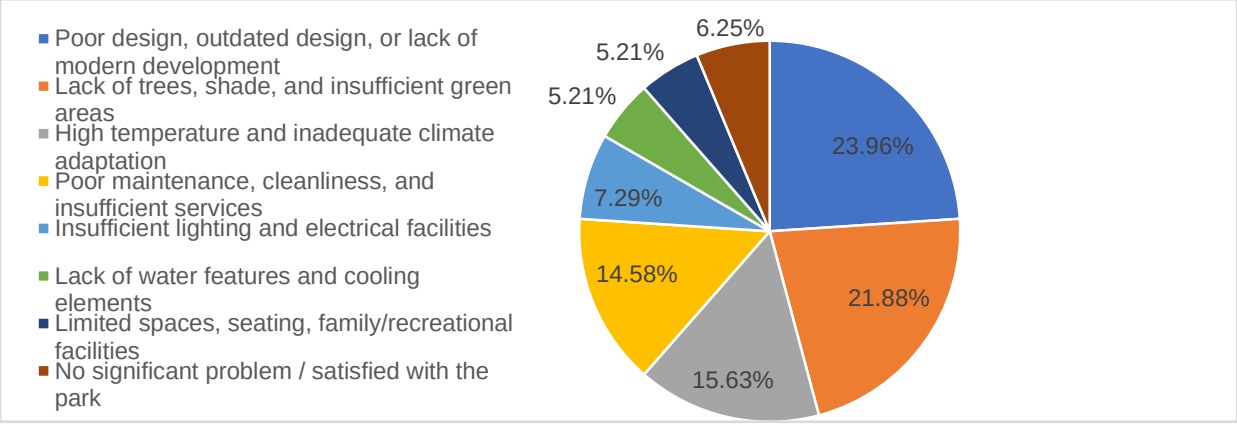
Table 16. Pathways are accessible for all users, including elderly and disabled

Pathways are accessible for all users, including elderly and disabled.	Frequency	Percentage (%)	Chi-square value:
Agree	86	48.6%	$\chi^2 = 45.39$
To some extent	74	41.6%	
Disagree	17	9.6%	
Total	**177**	**100%**	

A total of 48.6% felt that the paths were accessible to all, including the elderly and disabled, while 41.6% found the accessibility sufficient only to a certain extent and 9.6% disagreed. The results were highly significant, χ^2 (2) =45.39, $p<0.001$. This implies that accessibility is satisfactory; however, there is a need for further improvement based on the principles of universal design.

While the survey respondents were asked openly in section six at questionnaire form about the most important Environmental, cultural and universal design problems in the design of their public parks, after thematic analysis of open-ended responses obtained most of the answers focused on the climate problems in their areas, especially high urban temperatures and lack of cooling design At the same time, they emphasized the poor services in the parks, rarely the cultural aspects was mentioned, and only a few believed that more space for family recreation and family activities could be provided socially when designing public parks elements. As is clear from (Chart 1).

Chart 1. Main Design and Environmental Problems Observed in the Parks of Iraq



The most common complaint was poorly planned or old park design (23.96%), followed by the lack of trees, shade, and green areas (21.88%), high temperatures and insufficient adaptation to the local climate (15.63%), and insufficient maintenance and cleanliness (14.58%). The chi-square test revealed a significant difference, χ^2 (7) = 31.17, $p<0.001$, which implies that the distribution of complaints was not equal.

Similarly, when we asked respondents for suggestions on improving the design of public parks in their areas, the majority suggested adding design elements that lower temperatures, while some suggested improving park services and a minority of Kurds suggested more cultural, historical, and cultural activities did as show in (Table17)

Table 17. Thematic Analysis of Respondents' Suggestions for Improving the Parks

Table (X): Thematic Analysis of Respondents' Suggestions for Improving the Park's Climate and Cultural Suitability	**Approx. Frequency**	**Approx. Percentage**	**Chi-square value:**	**Examples of Respondents' Suggestions**
Increasing trees, vegetation, and green spaces	30	25.00%	**χ^2 =43.3**	Planting more trees, shade trees, increasing green areas, and selecting climate-adapted plants
Increasing shading and protection from heat	14	11.70%		Installing shade structures, planting large shade trees, wooden shelters, and reducing solar exposure
Increasing fountains and water features	12	10.00%		Fountains, artificial lakes, water features, fans and misting systems
Maintenance, cleanliness, and service improvement	18	15.00%		Improving cleanliness, maintaining trees and

				playgrounds, and maintaining park facilities
Landscape design improvement and modernization	12	9.00%		Redesigning the park, updating existing designs, adopting modern designs, and following international park standards
Improving public facilities and services	12	10.00%		Increasing toilets, benches, health facilities, and other public services
Facilities and activities for children and families	8	6.70%		Children's playgrounds, sports areas, family spaces, and greater privacy
Integration of local culture and heritage	5	4.20%		Displaying Kurdish cultural elements, historical statues, local heritage, and cultural activities
Improving night lighting	5	4.20%		Increasing lighting fixtures and improving nighttime illumination
Expanding parks and establishing new parks	5	4.20%		Increasing Park areas and establishing additional parks and recreational spaces

The thematic analysis of respondents' suggestions revealed several themes that can improve the climatic and cultural provisions of public parks. The highest percentage was "increase tree, vegetation, and green area," which accounted for 25.00%. "Maintenance, cleanliness, and services improvement" came second, with 15.00%. The third and fourth themes were "increase shading and protection from heat" (11.70%) and "landscape design improvement and modernization" (9.00%). "Fountains and water features" (10.00%) and "Facilities and activities for children and families" received 6.70%. "Local culture and heritage integration," "better lighting at night, "and "extension of parks and creation of new parks scored 4.20%, 4.20%, 4.20%, respectively. The chi-square value for the presented scheme was $\chi^2 = 43.3$. It can be noted that the respondents are primarily interested in increasing the amount of vegetation, improving thermal regimes, and upgrading park maintenance and landscape design. They also expressed a significant interest in developing cultural provisions, providing facilities for families.

When we compared the responses of the participants in the three parks in Erbil, Baghdad and Basra with SPSS, we obtained the following results as explained in (Table 18).

Table:18 Comparison between study sites responds overall agreement

factor	Indicator	City	Agree	To Some Extent	Disagree
Environmental	sufficient shade to protect from direct sun in summer	Erbil	**61.54%**	38.46%	0.00%
		Baghdad	54.76%	38.10%	7.14%
		Basra	48.72%	41.03%	7.69%
	Suitability of Plant Species for Local Climate and Soil Conditions	Erbil	73.08%	23.08%	3.85%
		Baghdad	69.05%	26.19%	4.76%
		Basra	51.28%	46.15%	2.56%
Cultural	Cultural identity landscape elements reflect local identity and historical heritage.	Erbil	**53.85%**	34.62%	11.54%
		Baghdad	47.62%	45.24%	7.14%
		Basra	25.64%	**51.28%**	23.08%
	Open spaces are suitable for local cultural and social festivities	Erbil	53.85%	38.46%	7.69%
		Baghdad	**59.52%**	35.71%	4.76%
		Basra	30.77%	38.46%	**30.77%**
Universal design	Pathways are accessible for all users, including elderly and disabled	Erbil	**69.23%**	15.38%	15.38%
		Baghdad	42.86%	**47.62%**	9.52%
		Basra	30.77%	**53.85%**	15.38%

The results provide an insight into the perception of the respondents on the state of the art of the landscape and environmental quality of Erbil, Baghdad and Basra. From the scientific perspective, the results reveal that there are significant differences among the three study sites in terms of the provision of shade, planting suitability، sense of place, use of planting to provide cultural and social space, accessibility and maintenance. Such differences could be related to climatic, environmental, urban, landscape and cultural factors that are different for the study sites and may explain the observed differences to a certain extent.

1. **Shade Protection**

The evaluation of shade provision in all the three cities was positively assessed by participants with Erbil recording the highest percentage of agreement (61.54%) followed by Baghdad (54.76%) and Basra (48.72%). In Basra, about 41.03% of the respondents selected option two which was 'to some extent' suggesting that shade provision is moderately satisfactory. This trend may indicate the importance of providing shade as an adaptation measure in the hot climate of Iraq. This is particularly so in Basra where less than half of the respondents agreed that shade was important. Therefore, there is need to

encourage the planting of shade trees, pergolas and provision of seating walls and passive cooling structures in the study area.

2. Plant Suitability

The suitability of plant species in Erbil was the most preferred one (73.08%) and in Baghdad (69.05%), whereas in Basra the preference accounted for 51.28% and "to some extent" 46.15%. The total positive response in Erbil can be seen as a sign of a proper matching of plants with environment. However, the results on Basra reveal that almost half of the respondents are unsatisfied with plant selection in that city. From ecological perspective the results are interesting. Climate, water supply, soil, salinity, resistance to heat and maintenance and flowering seasons are factors to consider when selecting plant species and plants. An inappropriate choice of species in Basra may cause growth in irrigation costs, plants loss and maintenance costs.

3. Cultural Identity

The results of the recognition of the results of the cultural identity are positive, amounting to 53.85% in Erbil, 47.62% in Baghdad, and 25.64% in Basra. It is interesting to note that the figure for Basra is the lowest among the three cities for this item, which is 23.08% of disagreement. Thus, from these results, it can be seen that the influence of landscape design on the presentation of local cultural characteristics is not absolute in these three urban spaces, as it is manifested differently in the respondents' perceptions. It can be argued that it is the perception of natural landscapes and their association with local culture that determines the high result in Erbil. In turn, a similar but lower value in Basra, amounting to 51.28%, indicates the presence of cultural identity, which, however, is not so obvious. This indirectly confirms the idea that the development of the landscape should be based on the analysis of the cultural layer, taking into account historical periods, spatial planning solutions, building materials, vegetation, and social elements rather than following general trends.

4. Open Cultural and Social Spaces

The highest rate of agreement (59.52%) was expressed by the sample in Baghdad, followed by Erbil (53.85%). The agreement rate was significantly low in Basra at 30.77% with disagreement being the highest at 30.77%. This evidence implies that residents perceive enhanced opportunities for social interactions and collective outdoor activities in Baghdad. On the other hand, it points to a possible deficit of accessible public open space for community interaction in Basra. From a planning perspective, it underlines the need to create public plazas, community gardens, shaded gathering spaces, pedestrian areas and multifunctional parks. These public spaces are essential elements in promoting social interaction, a sense of community and an improved quality of life in cities.

Accessibility

Accessibility is another notable difference. The highest agreement was in Erbil 69.23%, followed by Baghdad 42.86% and Basra 30.77%. Furthermore, there are 53.85% respondents in Basra who answered 'to some extent' which shows the

accessibility is not fully attained. The results suggest there is still a need for accessibility in landscape in the planning process, especially in the cities of Basra and Baghdad. How pedestrian moves and enters/exits the building, how the pathway network is created, how the building is accessible for the elderly and mobility impaired, surrounding street access and the presence of seating are factors to consider when evaluating accessibility. The good performance in Erbil indicates good perceived accessibility but with 15.38% disagreement there is still room for improvement.

Table:19 Comparative Assessment of Public Parks in Erbil, Baghdad, and Basra

Factor	Indicator	Main finding	interpretation
Environmental	Shade protection	Agree: Erbil 61.54%, Baghdad 54.76%, Basra 48.72%	Shading performance decreases towards Basra, indicating an increased need for climate-adapted cooling strategies.
	Plant suitability	Erbil 73.08%, Baghdad 69.05%, Basra 51.28% Agree	Plant suitability is generally positive but lower in Basra, suggesting the need for more careful selection of species adapted to heat, drought and local conditions.
cultural	Cultural identity	Erbil 53.85%, Baghdad 47.62%, Basra 25.64% Agree	Erbil has the strongest perception of cultural representation, while Basra has weaker cultural integration. Research indicates that local landscape features and cultural meanings contribute to place identity and attachment [25] .
	Open cultural/social spaces	Baghdad has the highest Agree (59.52%); Basra has 30.77% Agree and 30.77% Disagree	Baghdad scores relatively well in terms of social spaces, while Basra reports a greater deficit in spaces promoting social interaction. Urban parks provide important ecosystem services for recreation, socialization and culture [26] .
Universal design	Accessibility	Erbil 69.23%, Baghdad 42.86%, Basra 30.77% Agree	Perceptions of accessibility in Erbil are significantly better. Lower Basra result indicates the need for better paths, circulation, seating and inclusive facilities. Accessibility and park maintenance are acknowledged factors impacting park use and visitor experience [27] .

Basra is the clearest case of climate-responsive, the table identifies climate stress as the dominant design issue, including heat, inappropriate vegetation, lack of water, and the need for climate-responsive design. This is supported by environmental research in Basra, which identifies desertification, secondary salinization, vegetation degradation and wetland loss as important processes of environmental degradation [28]wetlands as important environmental degradation processes. Therefore, the results from Basra can be interpreted as indicating that plant selection and landscaping should be highly adapted to local environmental conditions, particularly heat, water availability and soil conditions. This is one of the strongest findings supporting the primary research hypothesis that environmental conditions influence plant selection and park design in northern, central and southern Iraq.

When comparing the opinions of the participants of the three cities in the three parks of Sami Abdulrahman in Erbil, Al-Zawra Park in Baghdad and Family Park in Basra, the participants of each city had their own opinions as shown in Table (20).

Table:20 Comparative Respondent Opinions on the Three Parks

Comparison of Respondents' Opinions among Erbil, Baghdad, and Basra			
Aspect	**Erbil – Sami Abdulrahman Park**	**Baghdad – Al-Zawraa Park**	**Basra – Al-Family Park**
Thermal comfort / Shade	Generally positive; many respondents agreed that shade is adequate, although some requested additional cooling and shading, especially in summer.	More critical opinions were expressed regarding insufficient shade and the suitability of the design for hot summer conditions. Respondents suggested more shade trees, shelters, and fountains.	The strongest concern was high temperature. Respondents repeatedly requested large shade trees, green surfaces, fountains, misting systems, and other cooling elements.
Vegetation and Green Areas	Respondents generally viewed vegetation positively, but several suggested increasing trees, greenery, and climate-adapted plant species.	Respondents frequently identified insufficient vegetation as a problem and recommended increasing trees and green areas, particularly evergreen and heat-resistant species.	Vegetation was a **major concern**. Respondents emphasized the need for more trees, shrubs, grass, ground cover, and species adapted to Basra's environmental conditions.
Water Features	Water features were suggested mainly as an improvement to increase cooling and comfort during hot periods.	Respondents strongly suggested increasing fountains and making better use of the existing lake and water elements to improve thermal comfort.	Water features were particularly important because of the severe heat. Respondents specifically suggested fountains, waterfalls, lakes, fans and

			misting systems.
/ Cultural Identity	Respondents showed interest in strengthening Kurdish cultural identity through statues, cultural displays, and architectural elements.	Respondents emphasized the need to modernize the design while also incorporating elements reflecting the city's heritage and social characteristics.	Cultural identity appeared less frequently than environmental concerns; respondents focused more strongly on climate, vegetation, water, and functional design.
Maintenance and Services	Some respondents requested better maintenance, more toilets, lighting, seating, and general services.	**Maintenance and modernization were major concerns**, including cleanliness, facilities, lighting, and outdated designs.	Respondents also requested better maintenance and services, but environmental and climatic problems were more dominant in their comments.
Accessibility	Some respondents considered the park accessible, while others requested better seating, movement, and facilities.	Accessibility and internal transportation were important concerns, particularly for elderly people, children, and people with disabilities.	Accessibility was mentioned, but it was less dominant than heat, vegetation, and water-related issues.
Main Design Problem	The main concerns were insufficient services in some areas, seating, lighting, maintenance, and the need for further design improvement.	The dominant concerns were **outdated design, inadequate maintenance, insufficient shade/vegetation, inappropriate use of spaces, and insufficient services**.	The dominant problem was **climatic stress**, especially extreme heat, unsuitable vegetation, water scarcity/salinity, and insufficient climate-responsive design.
Overall Perception	Generally the **most positive** perception among the three, with many "Agree" responses, although respondents still requested improvements.	A **mixed but more critical** perception, with considerable concern about the old design, maintenance, shade, vegetation, and functionality.	The **most climate-sensitive and critical** responses, particularly concerning heat, vegetation, water, and environmental adaptation.

1-Thermal comfort

Is the most important environmental problem. Table shows a clear geographical distribution: thermal comfort increases towards Basra. Respondents in Erbil were relatively positive about shade and cooling, whereas respondents in Baghdad identified lack of shade and need for additional trees and shelter. In Basra, the dominant concern was explicitly high temperature, with respondents calling for large shade trees, cooling systems and better environmental adaptation. Pattern is scientifically reasonable. Erbil experiences

very hot and dry summers, while Basra experiences an even harsher hot and arid environment. Therefore, the increasing concern about heat in respondents' responses can be interpreted as a reflection of regional climatic differences rather than simple differences in park preference.

3- Importance of bodies of water

The table shows that the importance of bodies of water was considered important to all three parks, but its importance seems to be enhanced in warmer environments. agrees with research demonstrating that water bodies can aid in cooling through evaporation and modification of the microclimate. thermal-comfort strategies found that both vegetation and water bodies reduce thermal-stress, though efficacy is conditional on climatic and spatial contexts. A recent study of dry city parks further found that the distribution and configuration of water bodies is important, rather than simply the existence a large body of water [29] . Therefore, the respondents' demand for fountains and water elements can be interpreted as evidence that blue infrastructure should be integrated into climate-sensitive park design in conjunction with green infrastructure. respondents' demand for fountains and water elements can be seen as evidence that blue infrastructure should be integrated with green infrastructure in climate responsive park design.

4- Maintenance and Service

An important finding from the Baghdad Chronicle is that the respondents were more concerned about maintenance, modernization, inappropriate use of spaces, and outdated design. Demonstrated that urban development, loss of green areas and inappropriate urban configurations contribute to increased urban heat-island effects and thermal discomfort [30]. Another study from Baghdad found that appropriate vegetation, urban geometry and materials can improve outdoor thermal comfort, including reducing average radiant temperature and heat stress [31] . Thus, the Baghdad results suggest that the problem is not simply a lack of green space, but rather the need for integrated park management and climate-sensitive redesign. climate-responsive redesign.

5-Cultural identity

The results also demonstrate an important difference between environmental and cultural requirements. In Erbil, placed considerable emphasis on Kurdish cultural identity and traditional elements, while Baghdad respondents emphasized modernization together with cultural and social characteristics. This suggests that park design in Iraq should not be based exclusively on climatic criteria.

Basra is the clearest case of climate-responsive, the table identifies climate stress as the dominant design issue, including heat, inappropriate vegetation, lack of water, and the need for climate-responsive design. This is supported by environmental research in Basra, which identifies desertification, secondary salinization, vegetation degradation and wetland loss as important processes of environmental degradation [28] . Wetlands as important environmental degradation

processes. Therefore, the results from Basra can be interpreted as indicating that plant selection and landscaping should be highly adapted to local environmental conditions, particularly heat, water availability and soil

Finding

The most salient thing to note is Erbil's overall superior results on nearly every measure, and Basra's overall poor ones on the same measures. Overall, Baghdad sits somewhere in the middle, but does very well on the open cultural + social spaces measure. The pattern indicates that the landscape quality in the three cities is affected by the difference of region environmental and climatic factors. The climate and conditions for vegetation in Erbil which is in northern Iraq are generally moderate. Baghdad is a transitional central environment, whereas Basra is experiencing highly increased environmental stresses and heat. It is therefore not possible to simply copy a landscape strategy from Erbil to Basra. It is important to note that the differences are not shown to be caused by climate alone. The problem of all three parks was quite good in terms of cultural reflection and suitable location for cultural, historical and social events except addition to the Kurds in Erbil, they suggested improvements. They wanted the parks to reflect their culture more. Garden designer experts from the universities that contacted via telephone interview gave us some important information, the most important of which was in public parks in central and southern Iraq because of High summer temperatures in central and southern Iraq are a major obstacle to using parks and public spaces throughout the day. To solve this problem and revitalize urban conditions. This is one of the strongest findings supporting the primary research hypothesis that environmental conditions influence plant selection and park design in northern, central and southern Iraq.

environments during the hot seasons, a multi-faceted strategy combining landscape designer, architecture engineering, environmental, and technological approaches must be implemented parks by Shading & Landscaping: Install canopy structures and plant fast-growing evergreen trees. And Use misting systems and water fountains along pathways to naturally lower surrounding air temperatures with Build air-conditioned indoor cafes and shaded, vegetation-lined walkways. So, Upgrade Park lighting and extend operating hours into the cooler evening and night. Finally Cool Pavement Materials by Replace heat-absorbing asphalt with light-coloured, permeable surfaces. About cultural factor garden design expert give us some significant recommend like Use regional architectures and heritage motifs (e.g., mountain stone in the North, Babylonian bricks in the Centre, and Sumerian/marsh themes in the South). And adding Plant climate-appropriate native trees and greenery (e.g., oaks in the North, citrus and date palms in the Centre, and aquatic plants in the South).

Discussion

Overall, Sami Abdul Rahman Park in Erbil determines a relatively high level of consistency with users' expectations across the assessed indicators, although this does not necessarily imply complete user satisfaction. These findings highlight the importance of collaboration among landscape designers, architectural

engineers, and specialists from the relevant municipal and cultural authorities to develop context-sensitive park designs that address local environmental and cultural conditions while ensuring accessibility and usability for all social groups. In existing parks where major modifications may be impractical, targeted design interventions can help address specific user needs. For example, in northern Iraq, incorporating Kurdish cultural symbols, sculptures, and dedicated spaces for Newroz celebrations could strengthen cultural identity and improve users' sense of belonging. In contrast, the findings for Family Park in Basra suggest a greater need to improve environmental adaptation. Rather than adopting a uniform design approach, landscape strategies should respond to the region's climatic and ecological conditions. Potential interventions include installing pergolas and canopy structures, planting trees that provide extensive shade, and selecting native, drought-tolerant, and salt-tolerant species suited to high temperatures and soil salinity. Such region-specific interventions can improve thermal comfort, strengthen cultural relevance, and enhance the overall quality and usability of public parks across Iraq.

Conclusion

The questionnaire results demonstrate that the design and use of public parks in Iraq are strongly influenced by environmental conditions, cultural identity and universal design needs,. The main findings are summarized as follows:

Park uses and social function: Family gatherings (42.4%) and Relaxation (39.4%) represented 81.8% of the main purposes of park visits, confirming the important social and recreational role of public parks.

-visits were the most common (52.5%), while 33.3% of respondents mainly visited during summer. Although 57.1% agreed that summer shade was adequate, 36.7% considered it adequate only to some extent, indicating a continuing need for better shade and heat protection. -68.9% fully agreed that plant species were suitable for local climate and soil conditions, while 28.2% considered them suitable only to some extent and 2.8% disagreed. This demonstrating that vegetation suitability varies between parks and regions.

-Only 41.8% agreed that landscape design elements reflect local identity and historical heritage, while 41.8% considered this only partly achieved. This indicates that cultural identity is present but requires further strengthening.

- 48.6% agreed that pathways are accessible to elderly and disabled users, while 41.6% considered accessibility adequate only to some extent. This confirms the need for further application of universal design principles.

The results indicate that Erbil generally achieves best in environmental quality, cultural identity, and universal accessibility, with the highest agreement for plant suitability (73.08%) and pathway accessibility (69.23%). Baghdad determines moderate performance, particularly in accommodating cultural and social festivities, where 59.52% of respondents agreed. In contrast, Basra shows comparatively lower satisfaction, especially about cultural identity (25.64%), suitability for cultural festivities (30.77%), and pathway accessibility (30.77%). Inclusive, the results highlight the necessity to improve climate-responsive planting, cultural

representation, and inclusive design, particularly in Basra, to enhance the environmental performance, cultural relevance, and accessibility of public parks across Iraq.

Recommendations

Based on the findings of this study

1. Adopt climate-responsive design: Instead of using a standard design method, create landscape plans tailored to Erbil, Baghdad, and Basra.

2. Enhance thermal comfort: Increase shade, especially in central and southern Iraq, with native trees, canopy structures, shaded walkways, water features, and misting systems.

3. Choose appropriate vegetation: Give native and climate-adapted plant species priority based on soil characteristics, water availability, and local temperature.

4. Strengthen cultural identity by including local cultural symbols, historical elements, traditional materials, and architectural styles into park design.

5. Improve nighttime utilization by extending park hours during hot seasons, improving lighting, and offering cozy evening amenities.

6. Encourage sustainable infrastructure: To lessen heat absorption and enhance environmental performance, choose light-colored, permeable paving materials.

7. Enhance inclusive design: Make sure that amenities and paths are accessible to senior citizens, those with disabilities, and other park visitors.

8. Promote community involvement: To guarantee that park designs represent local needs and preferences, include locals, cultural specialists, and landscape experts in the planning process.

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