



## The Role of Visual Elements in Revitalizing Urban Riverfronts: A Visual and Morphological Analysis of the Al-Gharraf Riverfront in Al-Shatra City, Iraq

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<https://doi.org/10.18280/ijstdp.210316>

### ABSTRACT

**Received:** 27 November 2025

**Revised:** 9 February 2026

**Accepted:** 19 February 2026

**Available online:** 31 March 2026

#### Keywords:

*riverfronts, urban landscape, visual elements, urban design, Al-Shatra city, Al-Gharraf River, urban sustainability*

Activating riverfronts is a key approach to enhancing the quality of the urban landscape, improving user experience, and deepening spatial connection with open public spaces. As such, this study aims to analyze and evaluate the visual and morphological elements of the riverfront in Al-Shatra city through a comparative study of the eastern and western banks of the Al-Gharraf River. It assesses the extent to which the visual and architectural components align with the requirements of sustainable urban design, to develop a vision that supports the revitalization of the waterfront and improves its visual, social, and economic appeal. The study employed a descriptive-analytical methodology based on field surveys, the collection of visual and spatial data, and the analysis of land uses, urban masses, building heights, and traffic patterns. It also evaluated aesthetic elements such as color harmony, architectural rhythm, landscaping, lighting, and advertising. Digital drawing and analysis tools, including Geographic Information Systems (GIS) and visual modeling software, were utilized to produce illustrative maps and supporting statistics. The results revealed a clear disparity between the two banks. The eastern bank was characterized by functional diversity encompassing residential, service, and institutional activities, while the western bank exhibited a densely populated commercial character, resulting in visual clutter and a decline in urban harmony. The study also highlighted a general weakness in nighttime lighting and facade organization, a lack of landscaping and shading elements, and inconsistencies in architectural rhythm. This led to a decline in the quality of the visual landscape and a diminished appeal of the riverfront as an effective urban space. The study's originality lies in its presentation of a comprehensive visual-morphological diagnostic framework applicable to medium-sized Iraqi cities. It proposes design approaches that support the principle of visual equity, improve the efficiency of the riverfront space, and enhance its role as a sustainable public space contributing to urban development goals, particularly the Sustainable Development Goals related to improving quality of life and the urban environment.

## 1. INTRODUCTION

Riverfronts are a pivotal urban element in shaping the identities of cities and enhancing the quality of life, providing a visual, environmental, and social connection between people and water, and revitalizing public spaces and stimulating economic, cultural, and recreational activities [1]. Many global cities have implemented advanced programs to revitalize their waterfronts by reorganizing urban blocks, improving the visual landscape, and providing pedestrian walkways, shade, and nighttime lighting, in line with sustainable urban design principles and promoting climatic comfort and civic vitality [2].

Although Iraqi cities, including Al-Shatra, possess a rich urban heritage of traditional riverfronts, these waterfronts face aesthetic and functional challenges due to unplanned urban

development [3]. The Al-Gharraf River in Al-Shatra is a significant visual and spatial focal point; yet, the current riverfront suffers from weak urban activation, a lack of a unified design vision, a decline in color harmony and urban rhythm, the proliferation of unregulated commercial advertising, a decrease in landscaping and shading, and inadequate nighttime lighting [4]. These problems negatively impact the visual landscape and user experience, as well as the site's ability to attract social and tourist events, necessitating a systematic design intervention for its rehabilitation [5].

Despite the spatial and symbolic importance of the Al-Gharraf River in shaping the urban fabric of Al-Shatra, the deterioration of the riverfront's visual landscape is not a circumstantial or temporary phenomenon, but rather reflects a structural flaw in urban planning and design mechanisms [6]. The waterfront suffers from a lack of urban design controls,

weak integration between functional planning and visual design, and limited local policies regulating building facades and commercial advertising [7]. This deficiency has resulted in a visually fragmented riverfront, lacking architectural rhythm and color harmony [8], and devoid of a gradual relationship between the building blocks and the water surface, thereby weakening its ability to function as a vibrant and integrated public space [9].

This study is based on the premise that the low level of visual harmony, fragmented land uses, and lack of landscaping, lighting, and visual organization have contributed to a decline in the attractiveness of the riverfront in Al-Shatra [10]. It posits that adopting a sustainable urban design framework can improve the landscape's quality and enhance social and economic interaction with the waterfront [11]. Accordingly, the study aims to analyze and evaluate the morphological and visual characteristics of the riverfront, diagnose the differences in the urban landscape between the eastern and western banks, identify strengths and weaknesses, and determine development requirements [12].

Contemporary urban design literature indicates that the quality of riverfronts is measured not only by the efficiency of their functional uses, but also by their ability to produce a visually appealing urban landscape that is coherent in its elements and conducive to social interaction [13]. This approach emphasizes that elements such as architectural rhythm, facade continuity, the organization of open spaces, advertising control, and nighttime lighting collectively constitute what is known as the "mental image of the place," a crucial factor in the success of public spaces [14]. Therefore, analyzing a riverfront requires an integrated approach that combines the morphological structure of the urban fabric with the visual elements that influence the user's experience and perception of the place [15].

In this context, the study adopts the concept of "integrated urban vision" as a planning and design framework aimed at coordinating the relationship between urban structure, urban function, visual landscape, and the environmental dimension of the riverfront [16]. This vision includes organizing building blocks and their heights, standardizing facade treatments, regulating commercial advertising, enhancing green spaces and shading, developing pedestrian walkways, and activating nighttime lighting [17]. This achieves visual and functional integration between the two banks of the river and repurposes the riverfront as a public space that supports urban identity and sustainable development [18].

The study seeks to answer key questions related to the nature of the urban and visual characteristics of the waterfront, the distribution of urban uses and activities, the level of color harmony and visual rhythm, the challenges that weaken the quality of the urban experience, and appropriate strategies for improving the riverfront landscape. Its detailed objectives include analyzing land uses, facades, and elevations; evaluating visual landscape elements; conducting a comparative analysis between the two banks; and proposing a design framework applicable to similar Iraqi cities.

The study's scientific significance lies in enriching the literature on revitalizing riverfronts in medium-sized Arab cities and providing an applied model for visual-morphological analysis. Its practical importance is evident in supporting local authorities in developing design policies, improving the visual identity of the waterfront, and enhancing its ability to attract tourism and urban investment.

Although several international studies have addressed

riverfront rehabilitation, most have focused on major cities or on environmental and economic aspects [19], with a clear lack of studies examining medium-sized cities within the Arab and Iraqi context from an applied visual-morphological perspective [20]. Furthermore, local literature lacks diagnostic models that compare riverbanks within a single city and link morphological differences to the quality of the urban landscape. Thus, this study seeks to address such a research gap [21].

The study covers the two banks of the Al-Gharraf River within the Al-Shatra district. It utilizes field data and visual and morphological analysis for the period 2024–2025, focusing on visual elements without addressing hydrological aspects. The methodology is descriptive and analytical, supported by drawing and visual analysis tools. The study aligns with the Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities) through improving public spaces and the urban landscape, SDG 3 (Health and Well-being), SDG 8 (Local Economic Growth), SDG 13 (Enhancing Shade and Climate Comfort), and SDG 15 (Rehabilitating Riverbanks and Urban Ecosystems). Therefore, the study provides a theoretical and practical framework for revitalizing the riverfront in Al-Shatra and enhancing its visual, social, and economic value as a dynamic urban space that supports the city's identity and the sustainability of its urban environment.

## 2. METHODOLOGY

This study adopted an analytical-descriptive approach of an applied nature, based on the integration of quantitative and qualitative analysis of the urban landscape and morphological elements of the riverfront in Al-Shatra city. This approach aims to understand the visual and functional patterns associated with the banks of the Al-Gharraf River and to determine the degree of urban harmony and the quality of the urban landscape through meticulous field analysis supported by geospatial data and specialized measurement tools. This approach was chosen for its ability to address the spaces of historical and medium-sized cities and to analyze the visual characteristics associated with both the urban structure and its functionality.

The study began with the collection of primary data through a direct field survey of the riverfront on both sides of the river. This included high-resolution photographic documentation of urban landscape elements and recording observations on land use, architectural rhythm, building heights, facade styles, vegetation distribution, commercial advertising elements, and daytime and nighttime lighting levels. The river strip was divided into urban blocks on both the east and west banks. These blocks served as recurring units of analysis, allowing for the comparative measurement of architectural and visual characteristics along the entire length of the waterfront, according to specific lengths and distances covering the entire study area.

Subsequently, a geographic database was constructed using a Geographic Information System (GIS). This database was used to delineate the study area, analyze the distribution of urban activities, record the locations of distinctive visual elements, and produce thematic maps illustrating the formal and functional variations between the two banks. This was supported by survey data and recent satellite imagery from

Google Earth Pro, with the data processed and transformed into measurable and comparable spatial layers.

The study also utilized visual-spatial analysis software such as SketchUp to illustrate the relationships between building blocks and their rhythms. Statistical analysis tools in Excel were employed to calculate land use ratios, building heights, and spatial distributions. To ensure the objectivity and accuracy of the results, a Visual Assessment Checklist based on urban planning and waterfront design criteria was adopted. This checklist included dimensions such as color harmony, facade regularity, quality of landscaping and shade, quality of nighttime lighting, and clarity of pedestrian pathways and overall visual structure of the space.

The checklist was adapted with the local context, drawing on literature on riverfront planning and urban landscape enhancement. Validity was verified by comparing field measurement results with map data and aerial photographs, while reliability was verified by reviewing the measurements multiple times at different intervals.

The study also employed a qualitative interpretive analysis to support the numerical results. This involved analyzing the relationships between human activity, land use distribution, and their impact on urban landscape quality.

The results were compared with international models for riverfront development in other cities to provide a broader interpretive framework that enhances the applicability of the findings within the context of sustainable urban design and the revitalization of waterfronts in Iraqi cities. Thus, the methodology combines visual and spatial tools, quantitative measurement, and interpretive qualitative analysis, within a comprehensive research framework aimed at reaching practical and applicable recommendations.

### 3. MATERIALS AND STUDY AREA

#### First: Materials Used in the Research

The study relied on a diverse and integrated system of materials, including field, digital, and reference sources, to build a precise analytical base for the morphological and visual characteristics of the riverfront in Al-Shatra city. The main materials included the city's master plan issued by the municipal departments, official land-use maps, GIS data, and high-resolution aerial photographs obtained via satellite sensing platforms. Field tools included manual surveying instruments, professional cameras for documenting facades and public spaces, and field notebooks for recording observations related to visual gradients, movement patterns, and the characteristics of urban elements affecting the landscape.

At the analytical level, the study utilized a range of specialized software, such as ArcGIS and QGIS for cartographic analysis and spatial linking of fieldwork, SketchUp for building analytical models to illustrate the formal relationships between urban blocks, and Excel tools for creating statistical tables and analyzing digital data. Google Earth Pro was also used to verify the distribution of urban activities and track temporal changes in the urban fabric along the waterfront. This combination of materials and tools contributed to building a comprehensive and reliable data framework, which can be used to study and characterize the urban, environmental, and visual composition of the site, according to modern planning approaches consistent with the requirements of sustainable urban research.

#### Second: Description of the Study Area

The city of Al-Shatra is located in the Dhi Qar Governorate in southern Iraq, within the Middle Euphrates region. It is considered a medium-sized city with significant economic and social importance in the area [22]. The city is characterized by a historical river network, with the Al-Gharraf River as its cornerstone. The river flows through the city center, forming a major urban axis that has contributed over time to shaping the architectural and social identity of the place [23]. The study focused on the riverfront within the city center, extending along both sides of the river, due to its aesthetic, touristic, and functional value [24]. Furthermore, it is the area that best represents the interaction of the population with the river, whether through daily uses or commercial and social activities.

The study area is divided into two opposing banks, reflecting contrasting organizational and functional characteristics. The eastern bank comprises a mix of residential, service, and institutional uses, including government buildings, schools, and healthcare facilities, as well as scattered commercial activities. The western bank, on the other hand, is characterized by a clear dominance of commercial activities, markets, and mixed shops, making it an urban focal point with high pedestrian traffic and vibrant economic activity. This contrast in functional distribution between the two banks enhances the dynamism of the space, but simultaneously creates challenges related to visual cohesion and urban harmony.

#### Third: Justification for Site Selection

This site was chosen because it represents a dynamic model for riverfronts in medium-sized Iraqi cities undergoing rapid urbanization and diverse functional development. The selection of the riverfront in Al-Shatra city is based on its importance as a major urban gateway, a point of social interaction, and a commercial and service hub that contributes to shaping the city's daily life. The site also serves as a case study, offering significant development potential within urban improvement programs, river revitalization initiatives, and the development of public spaces in developing cities.

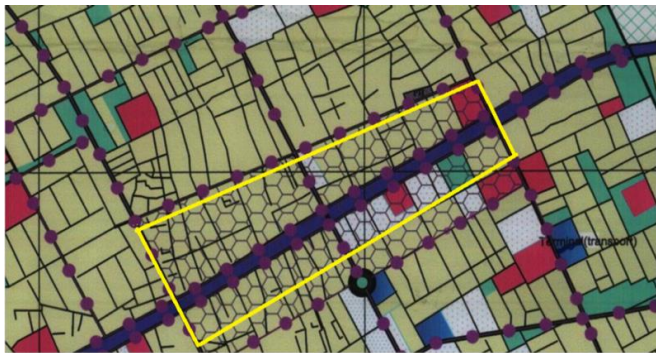
#### Fourth: Study Area Boundaries

The study area encompasses a continuous urban strip parallel to the Al-Gharraf River within the Al-Shatra district. It comprises a series of adjacent urban blocks, divided into units (blocks) representing analytical units for the riverfront system. These units were identified on both sides of the river and numbered sequentially to facilitate data collection and analysis using a pedestrian visual field methodology. This approach allows for a clearer understanding of the interaction between people and the river space, and an analysis of the quality of urban experience at the street level.

Locating the study area within its overall urban context is a crucial step in understanding its morphological and urban characteristics, as well as the spatial interaction between its urban and environmental elements. To clarify the geographical location of the riverfront under study and its relationship to the urban fabric of Al-Shatra city, the city's master plan was analyzed and the scope of the study was defined within it, as shown in Figure 1.

This analysis highlights the riverfront's extent and its proximity to various urban areas and activities. This spatial definition helps the reader understand the nature and significance of the site and establishes a precise analytical

framework for studying its visual elements and their impact within the surrounding urban environment.



**Figure 1.** The study area is located within the master plan of Al-Shatra city, demonstrating the extension of the riverfront within the urban fabric

The figure above shows that the study area is situated at the heart of Al-Shatra's urban development, adjacent to the Al-Gharraf River, which represents the city's most important natural feature and a major axis for movement and social activities. The site is surrounded by diverse urban units, including residential, commercial, and service areas, reflecting the importance of the riverfront as a vital urban space capable of supporting the city's social and economic activity. Its location within the main road network indicates its high urban permeability and integration with surrounding traffic arteries, making it a potential visual and developmental hub if rehabilitated according to a sustainable design vision.

#### **Fifth: Analytical Basis and Linking the Site to Development Plans**

The study is based on a visual-morphological assessment methodology that integrates with the principles of sustainable urban design and responds to the trends in rehabilitating riverfronts and improving the urban environment in Iraq. The site is part of local planning efforts aimed at enhancing the quality of urban life, developing pedestrian pathways, and revitalizing economic and social life by leveraging the river's environmental potential. It serves as a suitable urban laboratory for developing future design models that align with development requirements and the city's vision of creating a visually and functionally balanced waterfront that is sustainable and revitalizable.

The spatial distribution of land uses within the study area reveals a clear functional diversity surrounding the riverfront, reflecting the city's nature and its centrality within the urban fabric. Residential, commercial, and service activities coexist, underscoring the waterfront's importance as a hub for social and economic interaction. Analyzing land uses in this context helps understand the nature of urban demand for the riverfront, identify the types of existing activities, and determine the level of functional interaction between the urban fabric and the river as a key environmental and visual element. This analysis also helps identify opportunities for urban revitalization and rejuvenation that achieve a balance between function and spatial identity.

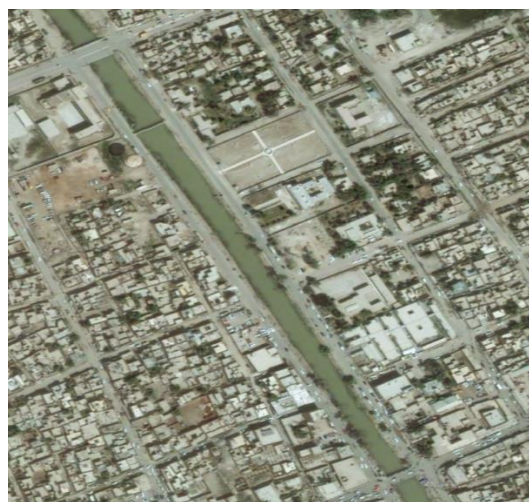
Figure 2 shows that the riverfront is surrounded by diverse land uses, predominantly residential, along with scattered commercial and service areas and urban activity centers. This distribution contributes to enhancing the role of the riverfront as a multifunctional public space with high potential for urban

and social revitalization. It also demonstrates the possibility of connecting the river to the adjacent road network, which supports the development of pedestrian and bicycle paths and improves urban connectivity. The presence of commercial and service blocks near the riverfront presents a suitable opportunity to promote visual regeneration projects and activate public spaces, in line with the principles of urban sustainability.



**Figure 2.** Location of the study area and land uses according to the master plan of Al-Shatra city

To clarify the actual morphological nature of the study area and its relationship to the riverfront and the surrounding urban fabric, a recent satellite image was used to show the general distribution of urban blocks, traffic routes, and open spaces, in addition to displaying the river extension, which represents the central element of the urban landscape, as shown in Figure 3. This presentation aims to enhance visual understanding of the area's nature and current conditions before commencing the detailed analysis.



**Figure 3.** Satellite image of a portion of the study area showing the riverfront and surrounding urban fabric in Al-Shatra city

The satellite image reveals a high urban density around the riverfront, with a relatively regular street network and closely packed residential blocks. This reflects a traditional urban pattern characterized by the proximity of the city's components and a high level of social activity. The riverfront also demonstrates its potential to become a vital urban axis, but it suffers from a lack of green spaces and numerous haphazard activities in its vicinity. These findings form the basis for analyzing the quality of the visual landscape and identifying appropriate design interventions to enhance the role of this waterfront as a public space with environmental and social value.

#### 4. RESULTS

The results of the field and visual analysis of the riverfront in Al-Shatra city show a clear contrast in urban and visual characteristics between the eastern and western banks of the Al-Gharraf River. This reflects a difference in the distribution of urban functions, the urban rhythm, and the level of visual organization. Field survey data revealed that the eastern bank is characterized by a diversity of land uses, with residential, commercial, service, and institutional functions intertwined, giving it a mixed urban character that contributes to the vitality of the riverfront in daily life. In contrast, commercial and economic activities are more concentrated on the western bank, with a high proportion of mixed commercial and residential uses, making it more economically vibrant but less functionally balanced in terms of public space.

Morphologically, the analysis showed that the average building height along both banks ranges from one to two stories, consistent with the local character of the city and reinforcing a human-scale approach to shaping the urban landscape. However, the regularity of facades and the coherence of urban lines were more pronounced in certain parts of the western bank compared to the eastern bank, which is interspersed with institutional service buildings (schools, government offices, and public facilities). These buildings create fragments in the urban rhythm and limit visual continuity along the riverfront. The results also revealed a limited number of unified architectural facade treatments and a weak application of shared design elements, such as color harmony and standardized signage, which negatively impact the overall visual harmony of the facade. The functional and morphological differences between the two banks reflect a difference in the dynamics of the space and its design needs, necessitating differentiated treatments for each bank within a unified, integrated vision for the riverfront.

To illustrate the structural and visual differences between the two banks of the Al-Gharraf River in Al-Shatra city, a comparative analysis of the morphological and urban characteristics along the riverfront was conducted. This analysis aims to identify points of divergence in urban composition, land use patterns, and the characteristics of building masses, contributing to the explanation of differences in the urban fabric and the quality of the visual landscape between the two sides. The following table illustrates the most prominent indicators that were observed in the field and studied within the framework of spatial and visual analysis.

Table 1 reveals a clear disparity in the organization of the riverfront. The eastern bank exhibits greater functional diversity due to the presence of residential, service, and public buildings, giving it a multi-activity urban character and greater

potential for social and cultural development. In contrast, the western bank is characterized by the dominance of commercial and mixed-use development, reflecting concentrated economic activity. However, this also leads to visual congestion and a visually disorganized repetition of commercial facades.

**Table 1.** Comparison of morphological characteristics between the eastern and western banks

Dimension	East Bank (E)	West Bank (W)
Number of building blocks	14 blocks	10 blocks
Dominant land uses	Residential + Services + Commercial	Commercial + Mixed-use
Average building height	One to two floors	One to three floors
Visual uniformity	Moderate	Weak
Daytime activity level	High	Very high
Nighttime activity level	Low	Low

Table 1 also shows that the buildings on the western bank are relatively taller than those on the eastern bank. This may contribute to enhancing its visual presence, but it could also lead to an imbalance in the landscape if unified design standards are not followed. Furthermore, daytime activity is higher on both sides, while nighttime activity is noticeably reduced due to inadequate public lighting and a lack of evening events. This underscores the need for design interventions and social revitalization programs to promote evening uses and support the visual and functional security of the area. These results underscore the importance of adopting a differentiated planning vision that addresses the unique characteristics of each bank, while developing integrated strategies to enhance the visual and functional coherence between them. This will strengthen the riverfront's ability to fulfill its role as a vibrant urban space within the city's fabric.

**Table 2.** Evaluation of the visual landscape elements of the riverfront

Visual Element	Overall Evaluation	Observation
Architectural rhythm	Low – Moderate	Significant variation in building facades
Color harmony	Low	Absence of a coherent color policy
Greenery and shading	Weak	Scattered, unorganized trees and limited shade
Advertising signage	High and unregulated	Noticeable visual clutter
Night lighting	Very weak	Lack of designed architectural and pedestrian lighting
Historical facades	Limited presence	Require restoration and visual enhancement

Evaluating the elements of the visual landscape is a key aspect of understanding the quality of a riverfront and its ability to provide an integrated and attractive urban environment for users. Based on field analysis and direct visual observation, a set of key elements that shape the visual perception of the place was identified. These include architectural rhythm, color harmony, landscaping and shading, commercial advertising, nighttime lighting, and the presence

of historical facades. This evaluation aims to diagnose the level of visual performance of these elements and reveal any shortcomings or discrepancies between them. This contributes to building a precise analytical framework that supports the interpretation of the urban landscape and proposes appropriate design solutions. Table 2 presents the results of this evaluation in detail.

In addition to the morphological analysis of the riverfront, a detailed visual assessment of the urban landscape elements along both banks of the Al-Gharraf River was conducted. The aim was to determine the quality of the urban space and the availability of design elements that enhance the attractiveness of the urban environment and its potential for social and touristic use. This assessment focused on a range of visual variables that influence the user experience, such as architectural rhythm, color harmony, the distribution of green spaces and shade, the organization of commercial advertising, the level of nighttime lighting, and the highlighting of historical facades. The following table summarizes the results of this assessment.



**Figure 4.** The river frontage on the eastern side of the Al-Gharraf River  
Source: The researchers



**Figure 5.** The river frontage on the western side of the Al-Gharraf River  
Source: The researchers

The visual assessment reveals that the quality of the urban landscape along the riverfront remains below par, with most key visual elements registering low to average values. This underscores the urgent need for reorganization and the development of integrated design approaches. The inconsistency of architectural facades and the lack of color harmony stand out as major issues that weaken the overall

visual rhythm of the space. The lack of vegetation and inadequate shade further complicates the climatic and visual comfort of the public area. The findings also indicate a haphazard and disorganized distribution of billboards, creating visual clutter and diminishing the overall aesthetic appeal, as shown in Figures 4 and 5.



**Figure 6.** The variation in building heights and finishing materials used in buildings on both sides of the Al-Gharraf River  
Source: The researchers



**Figure 7.** The irregularity in the commercial advertisements on both riverfronts  
Source: The researchers

Furthermore, nighttime lighting is a significant weakness of the riverfront area. The site lacks an urban lighting system that would enhance visual security and support the use of the space

at night. The presence of historic facades has not been effectively utilized to reinforce the spatial identity. These buildings require maintenance and visual enhancement to transform them into attractive elements that contribute to strengthening the local urban character. These findings underscore the need for a comprehensive visual improvement plan that includes extensive landscaping, improved lighting, organized advertising, and a unified policy for facade treatments, in line with the principles of sustainable urban design and enhancing the quality of life in the city, as shown in Figures 6 and 7.

At the level of public spaces, the findings revealed that the walkways and areas adjacent to the river suffer from inadequate pedestrian infrastructure, a lack of seating areas and continuous recreational spaces, and a clear shortage of shade and organized greenery, despite the availability of areas suitable for visual and environmental development. The problem of traffic convergence between vehicles and pedestrians was also evident in some sections, reducing safety and weakening the facade's social integration. Conversely, some sub-sections on the east bank offer future opportunities for improvement through the presence of public parks and service buildings whose surroundings could be developed to create attractions and revitalize the facade.

Furthermore, the results showed that the visual connection with the river remains weak in many sections due to the presence of architectural barriers or the absence of a visually gradual design towards the water, thus limiting the potential for utilizing the water feature as a primary visual element. It was also found that nighttime lighting is almost nonexistent or insufficient along the riverfront, negatively impacting the level of evening activity and the area's usability at night.

Based on these indicators, it can be said that the riverfront in Al-Shatra city possesses significant spatial and visual potential, but suffers from a lack of urban and visual planning. This necessitates the adoption of integrated design approaches that enhance the functional integration between the two banks and provide phased solutions that restore the waterfront to its natural urban role as a recreational, social, and cultural corridor, in accordance with sustainable planning standards and achieving an urban vision that supports quality of life.

## 5. DISCUSSION

The results of the visual and morphological analysis of the riverfront of the Al-Gharraf River in Al-Shatra city reveal that the existing problem is not limited to aesthetic weakness or formal deficiencies in the urban landscape, but rather reflects a structural imbalance in the relationship between functional planning, urban organization, and the management of the visual elements of public spaces. This confirms that the deterioration of the riverfront's quality is a cumulative result of the absence of an integrated urban design vision capable of coordinating the relationship between urban blocks, urban activities, the visual landscape, and the natural element represented by the river.

From a theoretical perspective, these results align with what contemporary urban design literature indicates, which emphasizes that the quality of public spaces, particularly riverfronts, depends on the perceptibility of the space and the continuity and cohesion of the urban landscape, not merely on the presence of the natural element. A riverfront only becomes an effective urban space when it is visually managed through

an organized architectural rhythm, a clear spatial sequence, and the organization of facades and advertising—elements that the field analysis revealed to be lacking in the case of Al-Shatra city.

To provide a deeper interpretive dimension to the results, the visual and morphological indicators revealed by the study were linked to theoretical concepts of urban design. This connection clarifies the impact of these indicators on the quality of the urban landscape and the user's perception of the riverfront. This linkage demonstrated that the lack of harmony among the facades, the dominance of commercial advertising, and the absence of nighttime lighting are not isolated phenomena, but rather direct consequences of the lack of urban design control tools and visual integration. This underscores that organizing visual elements is a fundamental prerequisite for the success of riverfront rehabilitation projects and their transformation into effective public spaces.

To further clarify the interpretive dimension of the results and move beyond mere description, the visual and morphological indicators revealed by the study were linked to theoretical concepts of urban design. This aimed to explain the impact of these indicators on the quality of the urban landscape and the user's perception of the riverfront.

**Table 3.** Analytical relationship between study results and theoretical concepts of urban design

Study Finding	Related Theoretical Concept	Urban Interpretation
Weak coherence of building façades	Visual imageability of place	Fragmentation of visual elements reduces the clarity of the riverfront's mental image
Dominance of commercial advertising	Urban design control	Absence of visual regulation has led to urban visual clutter
Weak visual connection to the river	Continuity of the urban landscape	Disruption of the visual sequence between the urban fabric and the water
Absence of nighttime lighting	Activation of public space	Decline in the social use of the riverfront after sunset

Table 3 above demonstrates that the decline in the visual quality of the riverfront in Al-Shatra is not accidental, but rather a direct result of the absence of urban design controls and visual integration. It emphasizes that the organization of facades, advertising, lighting, and the continuity of the urban landscape are essential elements for transforming the riverfront into a vibrant, perceptible, and sustainably usable public space.

Furthermore, a comparative analysis of the eastern and western banks reveals the pivotal role of the functional distribution of activities in shaping the visual perception of the place. The eastern bank is characterized by functional diversity, encompassing residential, service, and public institution uses, which theoretically makes it more suitable for hosting stable public spaces with a social and cultural character. However, this diversity has not positively impacted the visual quality due to the lack of unified design approaches and a weak visual connection with the river. In contrast, the west bank exhibits a high density of commercial activity, which boosts economic vitality during the daytime. However, this also leads to visual pressure resulting from the repetition of disorganized facades, the proliferation of advertisements,

and the absence of architectural rhythm. This weakens the perception of the place, transforming it into a transit space rather than a space for habitation and interaction.

These findings align with international experiences in riverfront rehabilitation, such as those of the Thames in London, the Seine in Paris, and the Cheongju River in Seoul. These experiences have demonstrated that the success of rehabilitation projects was not based on isolated cosmetic improvements, but rather on the adoption of systematic design approaches grounded in an integrated urban vision that combines visual organization, public space management, and the gradual strengthening of the relationship between the city and the water. In the case of the Thames, the rehabilitation process focused on regulating building facades and unifying their visual treatments, along with developing continuous pedestrian pathways that reinforced the perception of the river as a central element of the urban landscape. The Seine River project focused on transforming its banks into vibrant public spaces by reducing traffic congestion and promoting cultural and recreational uses within a clear regulatory framework. In contrast, the Cheong Gyeon project represents a more radical model. Its strength lay in restructuring the relationship between infrastructure and public space by removing visual and physical obstacles, restoring the river as an environmental and social element, and providing a clear spatial gradient that directly connects users to the water. A comparative analysis of these projects reveals a common thread: the presence of effective urban design control tools and the integration of visual treatment with urban function—a feature lacking in the Shatra Riverfront.

To enhance the comparative analysis and address the residents' observation regarding the limited engagement with international experiences, an analytical comparison was conducted between the current state of the Shatra Riverfront and several successful international riverfront rehabilitation projects. The aim was to extract design lessons applicable to the local context.

**Table 4.** Analytical comparison between the current state of the Shatra Riverfront and successful international experiences

Analytical Dimension	Al-Shatra	Successful International Practices	Key Lesson Learned
Façade organization	Unregulated	Relatively unified façades	Need to adopt an urban façade design guideline
Relationship with the river	Weak	Direct and gradual connection	Design of river-oriented pathways and stepped terraces
Nighttime lighting	Almost absent	Functional and aesthetic lighting	Activation of the riverfront's nighttime identity
Advertising management	Random	Strict control policies	Visual regulation to reduce clutter

Table 4 above shows that the gap between Al-Shatra and international experiences is not due to differences in natural resources, but rather to the absence of organizational and

design frameworks capable of managing the riverfront as an integrated public space. The comparison confirms that transferring lessons learned from international experiences does not require replicating solutions, but rather adapting their basic principles—such as organizing waterfronts, enhancing visual connection with the water, and activating the public space at night—to suit the urban and social characteristics of medium-sized Iraqi cities.

The results also revealed a weak visual and sensory relationship between the urban fabric and the waterway in Al-Shatra, resulting from the lack of spatial gradation and treatments that allow for a smooth visual and behavioral transition from the street to the riverbank. This separation is one of the most significant factors limiting the riverfront's ability to function as a unifying public space. It contradicts international principles for riverfront rehabilitation, which emphasize the need to humanize the relationship with water through pedestrian walkways, seating areas, and open spaces directly overlooking the river.

Nighttime lighting stands out as one of the most significant shortcomings in the urban performance of the riverfront. The absence of an integrated urban lighting system not only affects safety and security, but also limits the sustainable use of the public space outside of daylight hours and prevents the formation of a nighttime identity for the area. The literature confirms that activating riverfronts at night is essential for transforming them into vibrant urban spaces throughout the day, a goal that was not achieved in the case under study.

The importance of this study lies in its provision of a visual-morphological diagnostic framework applicable to medium-sized Iraqi cities, which differ from major cities in terms of resources, growth patterns, and urban management mechanisms. This framework contributes to a deeper understanding of the relationship between the local urban fabric and the quality of the urban landscape, and to the formulation of phased design interventions that are appropriate to the local socio-economic context.

Based on the above, the discussion emphasizes that the development of the riverfront in Al-Shatra should not be understood as an isolated aesthetic beautification process, but rather as a comprehensive urban restructuring process that requires integrating functional planning, visual organization, and public space management within a unified urban vision. The findings also demonstrate that achieving a balance between economic vitality, urban landscape quality, and the sustainability of social use represents the central challenge for any future intervention in the riverfronts of medium-sized Iraqi cities.

## 6. CONCLUSIONS

The morphological and visual analysis of the riverfront in Al-Shatra city revealed that this urban space possesses spatial, natural, and cultural assets that qualify it to be a dynamic urban hub. However, these assets remain underutilized due to the absence of a comprehensive urban design vision and effective tools for urban planning and regulation. The study demonstrated that the decline in the quality of the urban landscape is not attributable to a single factor, but rather results from the interplay of several elements. Among the most prominent of these are the weak pedestrian infrastructure, the fragmentation of urban facades, haphazard advertising, and the lack of aesthetic and environmentally supportive measures for

public space.

The results also confirmed a clear disparity between the eastern and western banks in terms of their functional and visual composition. The eastern bank is characterized by a diversity of functions and services, making it more conducive to hosting sustainable social and cultural activities. In contrast, commercial activities dominate the western bank, granting it significant economic vitality, though it suffers from visual congestion and a lack of urban planning. This disparity reflects the need to adopt different design approaches for each bank within a unified urban framework that ensures visual and functional integration between them.

The study also revealed a weak visual and sensory connection between the urban fabric and the waterway, resulting from the lack of spatial gradation and direct connection to the river, in addition to significant deficiencies in the nighttime lighting system. This has limited the effectiveness of the riverfront as a vibrant public space during the evening hours. These findings confirm that the rehabilitation of riverfronts cannot be limited to cosmetic improvements, but requires a comprehensive approach that integrates functional planning, visual organization, and public space management within a sustainable urban vision.

Accordingly, the study concluded that developing the riverfront in Al-Shatra city represents an integrated development path that contributes to strengthening urban identity, improving quality of life, and reconnecting the community with public spaces, in line with the principles of sustainable urban development, particularly the Sustainable Development Goals related to inclusive and safe cities.

## 7. RECOMENDASIONS

Based on the findings of the field analysis and theoretical discussion, the study recommends adopting an integrated urban vision for the rehabilitation of the riverfront in Al-Shatra city. This vision should harmonize the relationship between the urban structure, the visual landscape, urban function, and the natural element represented by the river. Such a vision requires formulating a comprehensive strategy for managing the riverfront as a primary public space, not merely an urban boundary. This will ensure the integration of design and planning interventions within a unified framework that reinforces the city's urban identity.

The study emphasizes the importance of improving the pedestrian environment along both banks of the river by developing comfortable and safe pathways that incorporate a human-centered design. It also calls for providing seating and rest areas, shaded areas, and open spaces that support the daily and recreational use of the riverfront. Enhancing safe and leisurely movement is a key factor in activating social interaction and transforming the riverfront into a vibrant urban space.

The study also recommends enhancing the riverfront green space by increasing planted areas, establishing continuous green belts, and planting trees suited to the local climate, in addition to incorporating natural and artificial shading elements that harmonize with the urban character. This approach contributes to improving environmental comfort, reducing heat stress, and enhancing the visual and sensory experience for users.

In light of the visual fragmentation and lack of harmony revealed by the findings in the urban facades, the study

recommends developing a specific urban design guide for the riverfront. This guide should include clear standards for facade treatment, material and color selection, and the organization of advertising signage, aiming to achieve visual harmony and minimize the clutter caused by haphazard placement. Such a guide would serve as an essential regulatory tool for controlling future urban growth and ensuring the sustainability of the urban landscape's quality.

Furthermore, the study highlights the need to strengthen the visual and functional relationship between the urban fabric and the waterway. This can be achieved by adopting a clear spatial gradient that connects the buildings to the riverbank, creating scenic walkways, observation platforms, and seating areas near the water. This type of intervention contributes to reintegrating the river into the daily lives of residents and reinforcing its presence as a central element of the urban landscape.

The study also indicates the need to develop an integrated urban lighting system for the riverfront, encompassing the illumination of pathways, distinctive facades, bridges, and public spaces, using energy-efficient and environmentally friendly technologies. This will help activate nighttime use of the waterfront, enhance the sense of security, and establish a nighttime identity that contributes to the sustainability of urban activity outside of daylight hours.

The study further recommends diversifying social and cultural activities along the riverbanks by introducing light and temporary events, such as open cultural spaces, artistic initiatives, and family activities. This will enhance the social use of the waterfront without compromising its overall character. This diversity will contribute to increasing urban appeal and achieving a balance between economic and social functions.

Regarding traffic flow, the study recommends reorganizing the relationship between vehicular and pedestrian traffic along the riverfront by minimizing overlap, reducing speeds, and utilizing natural or designed barriers. This will enhance traffic safety and support pedestrian priority in public spaces.

The study also emphasizes the importance of involving the local community, municipal authorities, and the private sector in the planning and implementation phases. This fosters a sense of collective ownership of the space and increases the chances of success and long-term sustainability for rehabilitation projects. This participatory approach is a pivotal element in managing riverfronts as dynamic public spaces.

Finally, the study recommends aligning all proposed interventions with the principles of sustainable urban development, particularly the Sustainable Development Goals related to inclusive and safe cities and quality of life. This will contribute to transforming the riverfront in Al-Shatra city into a scalable urban model that can be replicated in other medium-sized Iraqi cities, thus strengthening the river's role as an environmental, social, and economic driver within the urban fabric.

## 8. LIMITATIONS AND FUTURE RESEARCH PROSPECTS

Despite the comprehensive morphological and visual analysis adopted in the study of the riverfront of Al-Shatra city, the study faced several limitations related to the nature of the site and the available research resources. The most prominent limitation was the scarcity of up-to-date digital

planning data, which necessitated relying primarily on field surveys and direct observations to document urban and visual characteristics.

The study was limited to a specific section of the riverfront within the city center, which may not fully reflect the characteristics of all river extensions in the city. The study also faced the challenge of a lack of prior studies on the riverine urban landscape in secondary Iraqi cities, necessitating future efforts to address this research gap and enrich the local literature.

From a technical perspective, the analytical tools were limited to field observation and descriptive analysis supported by maps and photographs. Urban simulation models or quantitative assessments of pedestrian comfort, nighttime lighting performance, and the thermal impact on public spaces were not included. Therefore, the findings of this study represent a qualitative analytical foundation upon which to build more detailed design models in the future. Furthermore, the study did not include an extensive field-based sociological analysis of users' perceptions of the quality of the riverine space, a research perspective that could add significant knowledge to future studies by linking visual evaluation to social and behavioral dimensions.

Based on the above, the study proposes several future research directions, most importantly expanding the scope of the analysis to encompass the entire river within the city and linking it to surrounding urban traffic arteries. It also recommends developing 3D simulation models of the riverfront and studying the impact of environmental factors such as natural lighting, airflow, and temperature variations on the user experience.

Furthermore, the study recommends conducting participatory studies using questionnaires, interviews, and focus groups with residents and experts to explore aesthetic and functional preferences for the riverfront space and link them to sustainable design approaches. Innovative approaches such as using advanced GIS, computer-aided visual analysis, and artificial intelligence techniques in urban landscape assessment can also be adopted.

To conclude, this study represents a first step towards building a scientific and field-based framework for revitalizing riverfronts in Iraqi cities. It paves the way for future studies capable of integrating sustainable urban planning with the aesthetic and spatial analysis of urban waterways, thereby contributing to enhancing quality of life, solidifying visual identity, and activating the environmental and social dimensions of the city.

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