

# Sustainable urban heritage strategies for Iraq's holy cities: A case study of the Old City of Najaf

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## Abstract

Najaf is a preeminent historical sacred city, hosting millions of secular visitors annually. However, it suffers from chronic heritage management inefficiencies due to the lack of context-sensitive integrated systems. This study innovatively synthesizes the Historic Urban Landscape (HUL) approach with Sustainable Development Goals (SDGs) to redefine urban heritage in Old Najaf as a liveable, adjustable landscape rather than mere historical remnants. By focusing on the historic center, the research presents a framework for landscape-based planning tailored to sacred sites with deep religious and political resonance. Specifically, the study aligns urban interventions with SDG 11 (Sustainable Cities and Communities) to establish a measurable route for integrated heritage plans. Drawing on expert consensus, three sustainable development models were identified, integrating UN Principles, SDG 11 indicators, and UNESCO's HUL aspects. These models provide a strategic balance between modern social infrastructure needs and the preservation of sacred historical identity, offering a replicable blueprint for similar global sacred contexts.

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**Keywords:** Historic Urban Landscape (HUL), SDG 11 indicators, Religious tourism management, Urban regeneration, Context-sensitive planning

## 1. Introduction

The Old Najaf area, or the 'Ancient Najaf,' is an archeologically significant urban area that enables people to dwell and make religious pilgrimages permanently. Old Najaf also has the famous shrine of Imam Ali, where an organically structured community developed over time, including courtyard homes, buzzing bazaars, and alleyways, as is common in Islamic cities [1]. The coexistence of permanent residence with mass pilgrimage imposes considerable spatial and social demands on the city. Annually, more than five million pilgrims have prompted the proliferation of hotel constructions and hospitality services, altered the conventional urban structure, and displaced more than 500 families in the last decade [2]. Recent forecasts show an alarming 20% per annum growth of the urban fabric surrounding the historic core, putting at risk the fragile socio-cultural environment and historical continuity. If professionally managed, religious tourism in the city can become a source of equitable economic development and urban resilience [3]. There is plenty of literature that discusses

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heritage management in cities like Cairo [4] and Varanasi; however, large gaps are still present in the management of sacred towns like Old Najaf, where competing demands are all pressed upon the management. This study attempts to fill this knowledge gap by introducing a unified sustainable urban design paradigm for application in the historic core of Najaf. Heritage conflicts, which are compounded by the rapid pace of urban transition, are the fundamental cause of unusual urban crises in sacred towns, such as Najaf. These cities are able to serve dual purposes as both metropolitan areas and primary centers of pilgrimage. In Old Najaf, the regions that were controlled by religious tourism permitted unrestricted expansion, as well as the renewal of infrastructure, which led to the destruction of ecosystems that existed in the area and caused the old urban center to become split.

Although the adoption of a Historic Urban Landscape (HUL) approach aligned with SDG 11 has been widely asserted, current operational practices in Old Najaf are demonstrably maladaptive. These ongoing efforts are largely separate from the social and spatial complexities associated with sacred urban environments [5]. Many of the past attempts at designing and preserving these urban environments have been informative, but they failed to adequately integrate sustainable heritage management with community-focused adaptive growth strategies. Therefore, this work seeks to fill the gap created by the absence of prototypes for developing heritage frameworks utilizing scenario-based urban design within sacred historic core locations [6]. This research will utilize the three previously developed models of the Conservation-Centric Model, Adaptive Expansion Model and the Integrated Hybrid Model as tools to create a balance between conserving heritage while allowing for urban adaptation as well as supporting the social and economic sustainability of the area and to modify how the existing growth and development plans for the City of Old Najaf will proceed in the future.

Novelty in this research results from the multidimensional synthesis of the UNESCO HUL approach to high-density sacred urban centers with an adaptation of the United Nations Sustainable Development Goal 11 (SDG 11) framework. Previous studies focused on heritage as a static preservation process, while this study provides a new measurable method for transitioning Old Najaf into a sustainable and liveable environment. The main contribution of this research is the development and validation of three separate sustainable models based upon expert consensus, reconciling the dual impacts of mass pilgrimage visits (over 20 million annually) with the pressures created by modern urban development. This provides a major step toward filling the existing gap in context-sensitive heritage management for Islamic sacred cities.

## **2. Research method**

Data collected primarily came from a structured questionnaire of 20 local experts in fields related to urban design, planning, and heritage preservation, and were an important source for deriving new strategies developed for this research. The case study on the Old City of Najaf employed a questionnaire consisting of three parts: (1) challenges facing the city's heritage, (2) opportunities for heritage preservation and sustainability, and (3) proposed solutions for preserving the city's heritage and achieving sustainable urban development. The sample was selected through purposeful sampling to maintain an emphasis on the context of sacred cities. Thematically analyzed data were developed according to Braun & Clarke's (2006) coding framework and theme development. Quantitative data were based upon self-reported measures and assessed statistically to demonstrate the most often reported challenges and solutions provided. Qualitative (open-ended) data were analyzed using an inductive approach and categorized into three main thematic categories: (1) challenges, (2) opportunities, and (3) strategies to intervene. Overarching theme content was extracted to come up with urban design strategies in scenarios oriented toward the old Najaf.

## **3. Concepts of heritage conservation**

### **3.1. Historic Urban Landscape (HUL) approach**

The approach of Historic Urban Landscape (HUL), as created by UNESCO in 2011, aims to integrate the different facets of socio-cultural urban contexts, dynamically changing through time [7]. Opposite to traditional

conservation techniques, which put all effort into individual monuments or sites, HUL looks at the complete picture, paying attention to the cultural, social, environmental, and economic aspects [8].

Worship cities such as Najaf with intertwining urban form and religious functions are provided with a holistic methodology through the HUL framework for preservation, not only for the tangible structures but also for the ethnographic practices. Others still feel that even though HUL did not have a practical framework, it is rather theoretically flexible. Its fill-in-the-blanks approach becomes a crisis where cities are under extreme religious tourism from all sides. Thus, the comprehensive strategies that were proposed are what this paper aims to discuss.

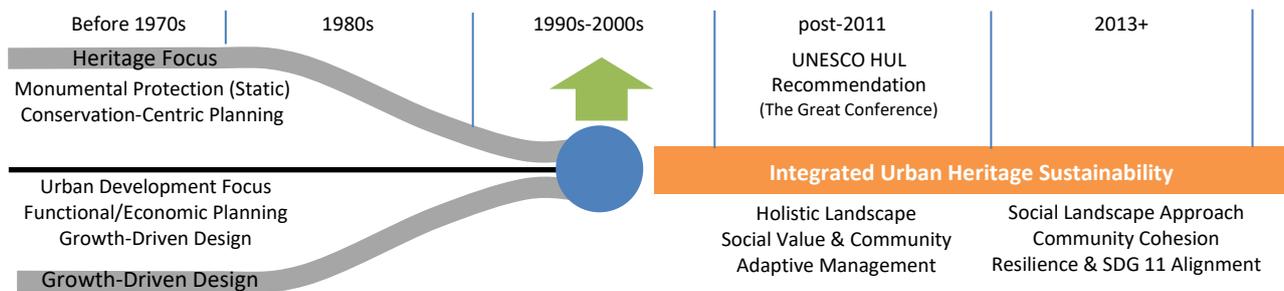


Figure 1. The concepts of heritage and sustainability have evolved in historic cities (this concept is adapted from the UNESCO Recommendation on Heritage and Sustainability in Historic City Centers, 2011/2013)

By using a planning method that looks at different possible futures based on global guidelines like the Historic Urban Landscape (HUL) [9], and Sustainable Development Goal 11 [10]. The study seeks to find a balance between maintaining a traditional heritage and promoting modern, strong urban growth and fairness in social and spatial aspects, concerning the opinions of experts and specialists, who were surveyed on four main topics. Figure 1 highlights a global shift from static monument preservation to holistic, sustainability-oriented urban strategies. This changing approach has produced a fundamental tension within sacred cities like Najaf, where existing planning methods are typically not aligned with such holistic principles.

### 3.2. Operative structures of implementing HUL

Heritage and urban development are being integrated through the Historic Urban Landscape (HUL) approach [11]. The 7-step process would carefully commence with a resource appraisal of nature, culture, and people for heritage baseline establishment [12]. Priorities for conservation that are in accordance with the requirements of the community are defined via the processes of participatory planning and stakeholder engagement [13]. The purpose of vulnerability assessments is to examine the dangers posed by climate change as well as the socio-economic factors that contribute to these dangers, and to provide information that can be used to incorporate these findings into larger urban frameworks [14]. Participatory planning and stakeholder engagement define conservation priorities aligned with community needs. Vulnerability assessments address socio-economic pressures and climate change risks, informing their integration into broader urban frameworks [15]. To increase stewardship and resilience, the next step is to prioritize conservation and development activities [16]. Local management systems and public-private partnerships are being put into place to bring about harmony in the implementation process and to maximize the mobilization of resources [17]. Maintaining the vitality and authenticity of historic cities and ensuring their distinctiveness is achieved through adaptive systems and outstanding management through continuous cooperation between relevant stakeholders.

### 3.3. Sustainable Development Goal 11 (SDG 11)

Sustainable Development Goal 11 is one of the goals that ‘aspire to make cities inclusive, safe, resilient, and sustainable.’ [18], outlined in the framework of the United Nations 2030 Agenda. More specifically, Target 11.4 speaks about strengthening efforts toward protection and safeguarding the world's cultural and natural heritage [19]. SDG 11 requires a prescription for balancing heritage conservation with socio-economic needs that emerge

from religious tourism and urbanization in Old Najaf to satisfy its requirements [20]. The current sacred city interventions more reflect facilitating economic growth rather than cultural sustainability, contradicting the integrated vision of SDG 11.

### 3.4. Sacred urban heritage management

Cities that are considered to be sacred, like Najaf, Mecca, and Varanasi, present issues for urban heritage management that are unlike any other [21]. Conventional planning models seldom take into consideration the complicated spatial dynamics that are generated by the simultaneous stresses of mass pilgrimage and permanent habitation.

Unregulated infrastructural growth and tourism commercialism mostly lead to irreversible loss of intangible and tangible heritage. Existing studies have proven this fact [22]. However, develop frameworks through which planning strategies can be adapted for sacred urban environments where religious symbolism and community cohesion must be maintained in the process of modernization.

### 3.5. Knowledge gap and conceptual alignment

Though the HUL Framework and SDG 11 became the major rationale suppliers, sanctified urban fabrics such as Old Najaf never find a place in this context [20]. Earlier attempts at planning by semi-formal bodies and their alternates have either swung towards functional scaling up of the infrastructure or towards the preservation of specific monuments, thus ignoring the fluid relationships among residents, pilgrims, and sacred space [20]. Table 1 below shows the stages of idea development over the last two decades.

This applied methodological framework builds on theoretical limits of heritage for urban (HUL) objectives and SDG 11 (sustainable cities & communities), and also accounts for the special issues connected with the management of sacred urban heritage. In addition to addressing these knowledge gaps through the literature review, this section defines the methodological design of the study (so-called instruments and analysis) for the study of sustainable heritage preservation in the Holy City of Old Najaf. As a result, the developed strategies are intended to incorporate international frameworks into local contexts of sacred urban environments while keeping academic integrity and practical usefulness [23].

Table 1. The stages of developing ideas over the last two decades

Year	Concept	Key objective
2011	UNESCO HUL	Shifting from isolated monuments to integrated urban systems.
2012	Landscape Management	Balancing heritage preservation with dynamic development.
2015	SDG 11 & Sustainability	Linking cultural heritage to socio-economic urban development.
2020	Sacred Cities Dualities	Managing permanent residency versus massive religious tourism.
2022	Framework Limitations	Identifying shortcomings in current models for cities like Najaf.

These developmental stage synthesizing efforts reveal a critical shift from theoretical global frameworks to specific urban applications. The milestones presented in Table 1 provide a general case for heritage-led sustainability and provide evidence of the continued importance of localized frameworks for navigating complex dualities associated with sacred historical cores. The section below addresses these constraints with a scenario-based design methodology that has been adapted to the socio-spatial context of Old Najaf in order to implement the HUL and SDG 11 principles through the creation of three different types of urban models.

### 3.6. Scenario development

As a result of the thematic analysis, a set of three urban design approaches was produced that could provide strategic responses to the identified problems: cultural spine strategy, heritage protection network strategy, and tourist & cultural nodes strategy. These approaches were compared to other comparable urban planning

proposals (e.g., Dewan's alternatives) in terms of relevance/context and feasibility. In addition to supporting scenario development, visual simulations and conceptual mapping were used for stakeholder interest and engagement purposes. Najaf, also known as Najaf al-Ashraf, is one of the most prominent cities in Iraq, located to the southwest of the capital, Baghdad. It has a population of 1,471,592 people and is considered the fifth most populous city in Iraq. It is also one of the most significant cities in Iraq, as it houses the shrine of Ali ibn Abi Talib, the first Imam of the Shiite sect and the fourth Rightly Guided Caliph of the Sunnis [24]. It is also the epicenter of the Iraqi Shiite seminary. The city's history dates back to the pre-Islamic era, when it was a center for Christian monasteries. Later, it became the capital of the Islamic state during the reign of Ali ibn Abi Talib [25]. The city was affiliated with Kufa. The origin of its name comes from "al-Manjuf," meaning a place that does not have access to water. The city is sacred to Muslims, especially Shiites, as it is the shrine of the first Shiite Imam, Ali ibn Abi Talib. It contains the mosques of Kufa and Sahla. The city also has several historical landmarks, most of which are Islamic.

For more than a decade, the city has seen an immense increase in religious tourism, with pilgrims' attendance crossing the five million mark annually. This results in a boom of hotel constructions, traffic planning, and commercial activities in the traditional residential areas [26]. Four comparative maps, shown in Figure 2 and taken from different studies and planning sources, have been used to visualize the chronological evolution of Najaf's historic core. Major phases of morphological transformation, boundary shifts, and urban infill are identified to form a basis upon which scenario-based design strategies can be built later in this study. In 2012, the Ministry of Municipalities and Public Works, together with Dewan Architects & Engineers Bureau, undertook a comprehensive urban regeneration project for the historic core of Najaf. Four strategic scenarios for the master plan were developed to reflect different urban visions: city orientation toward pilgrimage, knowledge city, residential city, and inclusive city. These scenarios collectively sought answers that would make it possible for the city to function both as a sacred destination and also maintain a living urban fabric.

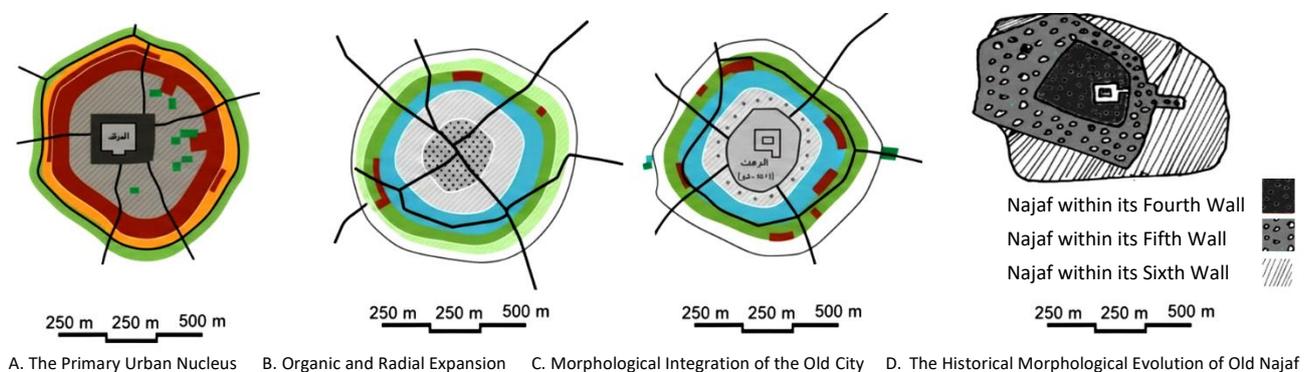


Figure 2. Comparative maps of urban expansion in Old Najaf (787 AH – Present): Conceptual illustrations (A, B, C) by the researcher showing morphological stages, and the actual historical fabric, prepared by the author based on data from [27] (D) representing the city's real state before modern expansion [27].

The first scenario mainly includes the infrastructure for visitors and expansion of the shrine; meanwhile, the second scenario highlights cultural preservation through educational anchors. The third scenario brings residential revitalization into focus together with socio-spatial cohesion, while in the fourth scenario, an integrative balance between religious, residential, and commercial dynamics is proposed. All scenarios, despite their conceptual divergence, highlighted.

It cannot be overemphasized how the “Dewan Project” from the Iraqi Ministry of Municipalities and Public Works in 2012 helped to formulate a vision for Old Najaf. What is clear is that it does not live up to contemporary urban standards.

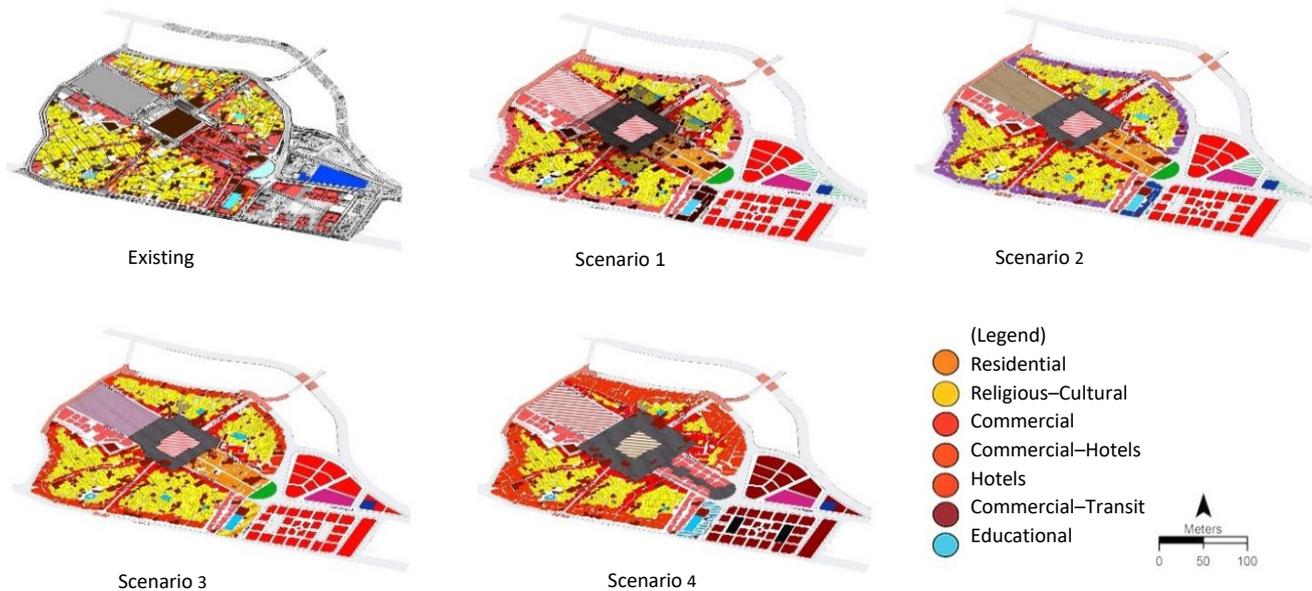


Figure 3. A look at how land is used in four different urban scenarios in Old Najaf [24]

Figure 4 provides a comparative land-use analysis under the four planning scenarios of the land in Old Najaf, proposed by Dewan's master plan published in 2012. In each scenario, an allocation of land functions represented a different urban vision. The color mapping identifies religious infrastructure, residential, commercial, public area service, and educational institutions. Particularly to note is that the Pilgrimage City scenario land allocates more shrine-related and commercial use, while Knowledge City expands educational and cultural function. Residential City preserves housing areas and improves them for demographic stability to be restored; City for All integrates mixed-use development meant to balance sacred, residential, and economic needs of space. Therefore, the changing fields of red and yellow shades in the different images suggest a new re-distribution of land use as a result of spatial planning priorities changes that are determined by their nearness in relation to the importance of discharge.

## 4. Results and discussion

### 4.1. Challenges, opportunities, and solutions

To understand how the built environment in Old Najaf is faring, a questionnaire was given to 20 professionals (urban planners, cultural heritage conservationists, and urban theorists). The data collected from this survey have been summarized in Table 2, with particular emphasis put on three dimensions or categories: challenges related to the preservation of Old Najaf's urban heritage, potential opportunities for preserving Old Najaf's urban heritage, and strategies for preserving Old Najaf's urban heritage. These dimensions constitute an important component of understanding the long-term viability of Old Najaf's urban heritage and will be used as the foundation for further analytical considerations.

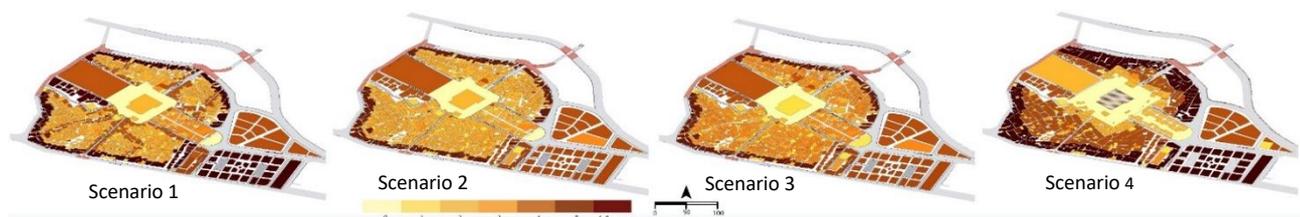


Figure 4. Comparative visualization of building height distribution across four urban scenarios in Old Najaf [24]. (Adapted from Dewan's Masterplan, 2012)

By analyzing the building height distributions of each of the four urban case studies presented in Figure 4, the challenges associated with modernizing Najaf's historic built environment can be clearly determined. These types of physical simulations will need to undergo empirical assessments to determine how the existing

management framework will support the ongoing urban integrity over time. Table 2 provides a summary of a select professional consensus survey that adds to the physical data by identifying expert opinions regarding urban design, heritage conservation, and strategic planning as it relates to the development of urban areas. The transition from spatial visualization to professional consensus permits the identification of critical connections between physical development pressure and strategic imperatives needed to maintain sustainable heritage management practices.

Table 2. Expert survey on sustainable urban heritage management in Old Najaf

	Section 1	Section 2	Section 3
Urban Design	Current urban legislation effectively protects heritage areas in Old Najaf	Religious Significance Enhances Cultural Tourism Potential	Enforcement of Updated Heritage Protection Regulations
Heritage Conservation	Urban Expansion Threatens Traditional Fabric	Improved Heritage Management via Digital Documentation	Religious Significance Enhances Cultural Tourism Potential
Urban Planning	Socio-Cultural Integrity Impaired by Tourism Development	Community Participation Enhances Conservation Efforts	Promoting Community Participation in Planning
Architect	Existence of Sustainable Funding for Heritage Conservation	Decentralization of Tourism Reduces Heritage Pressure	Digital Technologies for Monitoring/Management

These developmental stages demonstrate a significant change from theoretical global frameworks to their application in cities through particularized models. Table 1 provides many of the high-level reasons for heritage-led sustainable development, but also highlights the need for continued development of place-based frameworks to address the unique complexities associated with historic sacred centers around the world. Therefore, the next section enhances the limitations identified above by employing a scenario-based design process that builds on the unique socio-spatial context of Old Najaf in order to implement the principles of HUL and SDG 11 through separate unitary urban patterns.

#### 4.2. Conservation challenges

Creating a resilient heritage management framework starts with identifying the existing structural/systemic barriers in the current urban context [28]. The findings of the expert survey confirmed that many major conservation challenges hinder the sustainable development of Najaf's historic core. Each of these challenges (systems/structural) was classified and arranged as the database shows in Table 3 according to the level of agreement among the expert respondents.

Table 3. The key difficulties encountered by the experts during the survey.

Challenge	Percentage of experts agreeing
Weaknesses of existing urban legislation	85%
Uncontrolled urban expansion	78%
Threats to original architectural identity	80%
Lack of sustainable funding mechanisms for heritage projects	72%

As indicated by the findings presented in Table 3, the greatest impediments to successful conservation efforts are weaknesses in current urban legislation (85%) and threats to architectural identity (80%). The results also indicate that traditional preservation strategies will be ineffective in the face of uncontrolled expansion (78%) and inadequate funding for sustainability (72%). Thus, identification of these limitations serves as an important basis for developing potential solutions discussed in the next section, ensuring that any successful future strategic solutions will directly address these most pressing challenges.

### 4.3. Prospective opportunities

Experts have ranked the selection criteria for identifying opportunities in a manner that reflects their relative weights (importance) and influences toward achieving two objectives - sustainability and the protection of heritage - to contribute to the identification of those adaptive developments, service provisions, public spaces, and the interconnections among all cultural/social/physical/environmental dimensions that may be created within or upon historic urban fabric. The rank order of the selection criteria, as presented in the tables, creates a clear framework for decision-makers concerning where to allocate resources and establish policies that will create the greatest leverage for sustainable development in such a significant urban context.

Table 4. Key opportunities identified by experts

Opportunity	Experts agreeing
Najaf's global religious significance as a catalyst for sustainable development	90%
Substantial cultural and tourism potential	82%
Community-driven potential for urban renewal	76%
Advancement of digital documentation tools (GIS, 3D modeling)	88%

According to Table 4, Najaf's religious significance (90%) and advancements in digital tools (88%) are the most important opportunities. They serve as an empirical foundation to inform the subsequent strategic options. The spatial interventions using these high-consensus leverage points can thus provide a direct correlation with the expert-identified potential and urban resilience. Consequently, these findings justify the strategic shift toward the decentralized cultural nodes and heritage protection networks detailed in the subsequent section.

### 4.4. Strategic Solutions

Strategic interventions gathered around four main areas, as shown in Table 5. The strategic solutions to be proposed in answer to the challenges and opportunities discovered belong to four main strategic areas that, taken together, describe interacting interventions leading to a sustainable urban heritage management outcome (see Table 5). These are planning and urban design strategies; mechanisms of heritage conservation and adaptive reuse; socio-economic and community initiatives; environmental sustainability and infrastructure improvement measures. All four areas of interventions propose a holistic strategic framework that would bridge between the needs for modern urban development, pilgrimage activity, Sustainable Development Goals, and the historical as well as religious characters of Najaf's Old City in accordance with SDG11-urban heritage conservation approaches [3]. Overall, results show that experts unanimously agree on urgently adopting integrated and multi-dimensional approaches to address heritage conservation, particularly by aligning it with urban resilience and socio-economic sustainability [4].

Table 5. Key strategic solutions proposed

Solution	Experts agreeing
Updating legislative frameworks and establishing protected zones	83%
Fostering community participation in planning and management	79%
Investing in technological innovations (GIS, 3D modeling, Digital Twins)	95%
Promoting heritage-based tourism initiatives (small- and medium-scale)	81%

The spatial logics derived from these three scenarios translate abstract conservation principles into a structured framework that aligns with HUL and SDG 11. Experts have identified urban resilience and socio-economic sustainability as urgent needs. Thus, this method will help address these concerns by decentralizing activities and creating protective buffer zones. As a result, these results will serve as a reference for the subsequent comparison with Dewan's alternatives to compare how effectively they preserve the historic integrity of Najaf while still meeting the demands of pilgrims.

## 5. Scenario development based on findings

Based on the themes identified in the responses from experts, three scenarios of urban design and strategy were created to address some of the key challenges while pursuing the opportunities that exist to promote sustainable development and management of urban heritage in Old Najaf. The three scenarios developed relate to the concepts of Historic Urban Landscape (HUL) and Sustainable Development Goals (SDG) 11 in relation to the local challenges associated with each scenario, but are more focused on one dimension of these challenges than the entire context. Although the scenarios are not completely separate, nor fully integrated, they provide a first step towards establishing a common understanding to implement an integrated vision of how to maintain the historic center through its ongoing evolution.

### 5.1. Scenario 1: Cultural spine strategy

In this scenario, the aim of creating a continuous cultural axis is to connect all the major pilgrimage sites, historical sites, and public spaces both physically and conceptually. By doing so, we hope to enhance the strength of Najaf's religious and symbolic identity. This program also aims to provide an improved pedestrian experience in culturally significant open spaces. We will also seek to create greater connectivity between the residential area and historical landmarks; thus, contributing to the city's overall urban cohesiveness and ensuring the sustainable preservation of cultural tourism.

### 5.2. Scenario 2: Heritage protection network strategy

A second scenario is based on the principle of protecting the vulnerable urban fabric within old Najaf by creating heritage conservation zones and using sensitive buffers around them. It recommends that incentives be provided to encourage the repair and reuse of traditional structures in the region, in addition to the implementation of stringent regulatory development restrictions over any new projects that are located in the historic center. This will directly respond to the identified threats on the town - architectural identity loss due to uncontrolled extension - by ensuring that any form of urban growth respects and integrates with the historical character of the city.

### 5.3. Scenario 3: Tourism and cultural nodes strategy

Pragmatism regarding the opportunities for religious-based travel to Najaf means that one of Najaf's tourism and cultural initiatives is to develop selected sites beyond the major concentrated levels of historic heritage locations. By promoting new tourism-related development of the craft and marketplace, cultural hubs, and visitor services in areas outside of the historic core of Najaf, the objective is to decrease the burden on the historic core, to increase employment and other economic opportunities for the people of Najaf, and to distribute the economic benefits of tourism throughout the greater Najaf community. Figure 5 illustrates three urban design concepts for the Historic Core of Old Najaf with abstract spatial diagrams. The intent of these diagrams is to communicate the logic of layout and provide a representation of their elements as they relate to the spatial relationships between elements within the proposed urban design concepts.

An axial correlation made up of sacred, commercial, and public spaces can work together with a particular corridor, which has multiple different cultural programs placed within it as part of the cultural spine strategy (cultural spine, top left). In addition to this, the heritage protection network (HPN - top right) details concentric protection zones and buffer zones around those zones in order to have some way of exercising control over urban interventions that impact the integrity of their traditional fabric. Finally, the tourism and cultural nodes (bottom) also recommend decentralized planning around shrine hubs with redistributed activity capping in order to relieve the demographic pressures on heritage-sensitive sites. Therefore, these diagrams are intended to translate relatively obscure planning objectives into very clear design logics that spatially correspond to the principles of HUL and SDG 11.

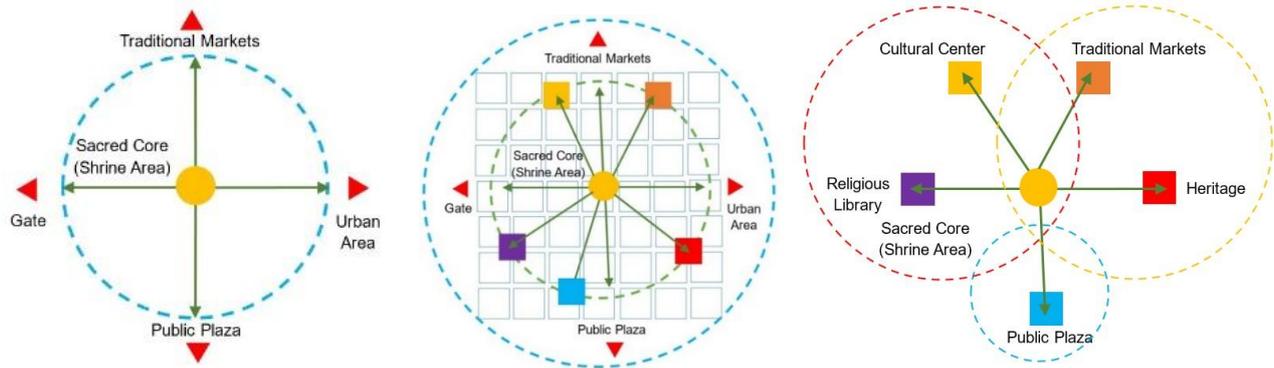


Figure 5. Conceptual spatial plans for the three scenario-based urban strategies for the Historic Core of Najaf. (Source: Author's elaboration based on expert analysis and planning frameworks)

The conceptual urban diagrams translate the general planning objectives into particular urban spatial logics consistent with SDG 11 and the HUL plan. The plan proposes where to redistribute the intensity of the urban environment and where to create cultural nodes away from the sensitive historic center of an Islamic city. This strategic framework is therefore designed to provide a clear reference point by which to assess current development proposals. The next section of this report will therefore analyze how the Dewan alternative proposals compare in terms of balancing what is needed for the religious tourist versus maintaining Najaf's traditional urban fabric.

## 6. Critical comparison with Dewan alternatives

A comparative analysis was carried out between the scenarios generated based on research and the official planning alternatives that had been earlier proposed by the Ministry of Municipalities and Public Works of Iraq, as a way of contextualizing scenario-based strategies proposed by it in 2012 (the Dewan Project). The Dewan alternatives defined 'Visitor City', 'City of Knowledge', 'City for Residents', and 'City for All', provided important first frameworks through which to lens future development of Old Najaf. But these proposals were made more than ten years ago under different socioeconomic and urban conditions. Since then, dynamics relating to religious tourism, urban growth, and socio-political contexts, as well as heritage degradation, have changed a lot. Hence, there is a need for new approaches that could be adaptive enough and driven by sustainability.

### 6.1. Key differences and advancements

Table 6. The proposed urban design approaches by Dewan Bureau, side by side with the scenarios adopted in this research

Aspect	Dewan alternatives	Research scenarios
Urban Focus	Singular focus per alternative (pilgrims, residents, knowledge)	Integrated multi-dimensional focus combining heritage, community, and tourism.
Temporal Relevance	Based on early 2010s urban dynamics	Post-2020 realities of rapid urbanization and climate resilience.
Heritage Strategy	Limited emphasis on intangible heritage and community identity	Emphasizes living heritage, spatial continuity, and community-led conservation.
Tourism Management	Concentration of activities near the shrine core	Decentralized distribution of tourism nodes to reduce pressure on sensitive areas.
Governance and Participation	Top-down planning approach	Encourages participatory, community-driven planning mechanisms.
Technological Integration	Limited	Integrates modern tools such as GIS, 3D modeling, and Digital Twins for dynamic management.

## 6.2. Implications

The Dewan alternatives, as shown in Table 6, though laying much-needed foundation for strategic consideration on Old Najaf, mostly adhered to classical approaches geared towards the urban planning issue, which tends to overlook today's intricate, multi-faceted problems. Other than the strategies proposed in this paper, scenario-based strategies are more responsive, wherein integration and adaptation preserve heritage while allowing the socio-economic growth of the city, together with urban sustainability. In response to changing realities in such sacred environments, this research attempts integration cum expansion of Dewan proposals through planning vision development aligned with HUL and SDG 11, which is further responsive.

## 6.3. Implications and discussion

Practical and abstract implications, above all in the management of sacred historic sites facing dual problems of rampant modernization and religious tourism. Practically speaking, the scenario-based method tries to add up to HUL by suggesting basic strategies of operation for 'sacred cities' like Najaf through methods that are socio-spatially tailored. More than offering policies, this resulting model from thematic expert insight analysis plus scenario planning offers preemptive design contexts that could be responsive to preconceived frameworks. One logic that emerges from this is the need for dynamic linkage between heritage conservation, urban resilience, and socio-economic sustainability, which is emphasized in Sustainable Development Goal 11 (SDG 11). This research demonstrates the necessity of a multi-scalar and flexible approach to heritage management at holy sites instead of a dogmatic approach that is remote from the real world. From a practical perspective. The scenarios offered here show how city growth does not conflict with the protection of the urban heritage by strategic touristic redistribution, and symbolic identity corridors reinforced, plus vital historic zones protected.

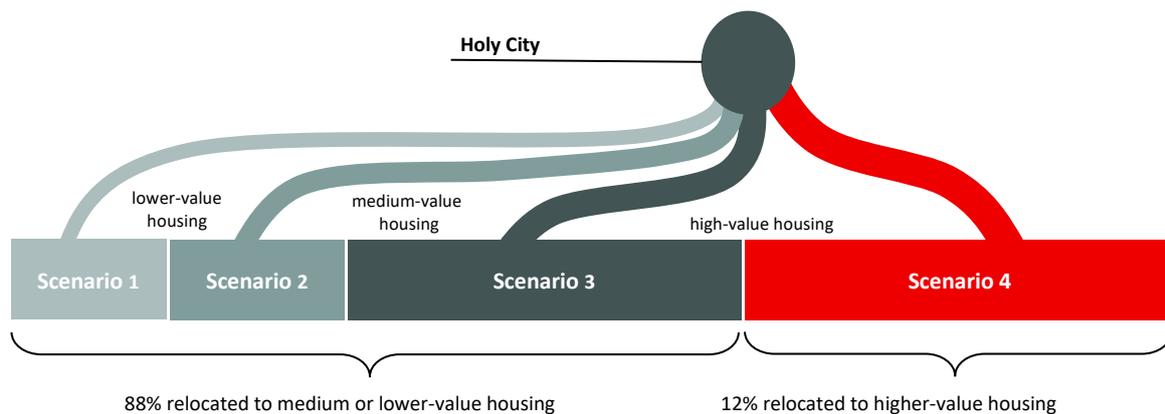


Figure 6. Holy cities like Varanasi, Mecca, and Karbala can absorb technological advances such as GIS and 3D modeling into community participation with decentralized growth (Source: Author's simulation based on scenario modeling and housing value typologies)

The use analysis for the four scenarios based on Figure 6, shows the relationship between urban development scenarios of Old Najaf and the risk of social displacement. While Scenario 4 happens to be the most ambitious urban transformation that also correlates with the highest possibility of resident displacement to peripheral or lower-value housing, this calls for planning models that align heritage conservation with social equity.

Though Scenario 4 is the most highlighted in the 2012 Dewan master plan and occurs as a scenario for high-density development, intensified land use, and vertical expansion, it critically falls short of aligning with the socio-cultural priorities identified by urban heritage experts, as indicated in Figure 7. Based on a multi-criteria evaluation that draws upon expert insight, this paper argues that Scenario 3 presents a more contextually responsive alternative; it achieves an appropriate synthesis between preserving the morphological and symbolic fabric of Old Najaf with contemporary urban demands that need to be fulfilled.

Also, the old planning models must be revised with steady input from religious heads, municipal planners, people, and the private sector to allow for the sustainable development of sacred historic zones. If not compensated for by the change, places like Old Najaf will have lost their religious, cultural, and urban reputation due to unrestrained growth. Ultimately, this study provides a method of planning that is both locally-based and globally modern, the purpose of which is to promote inclusion while also lasting over time.

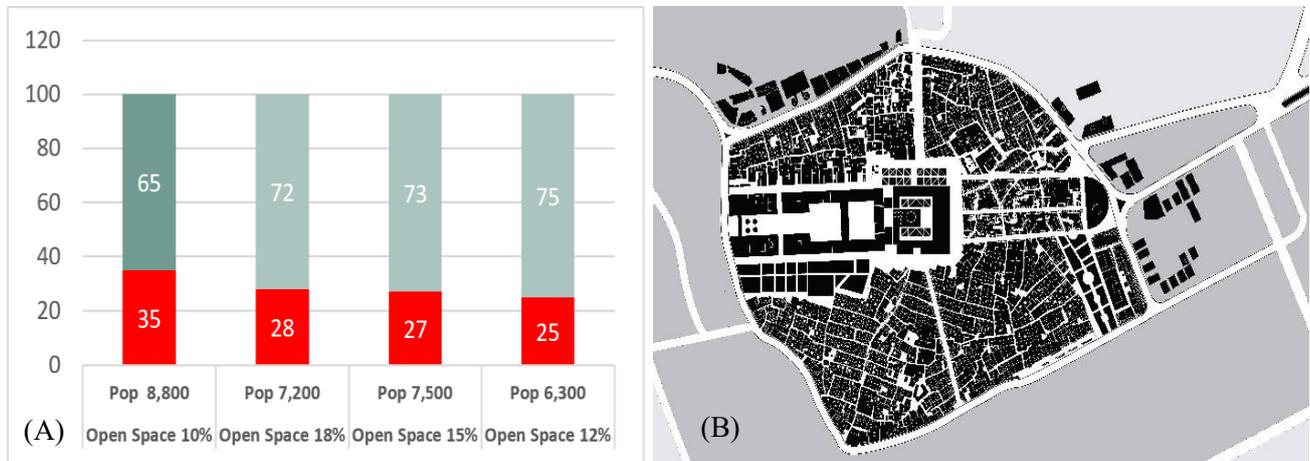


Figure 7. Urban design scenarios in Old Najaf by density, public space, and existing morphological structure. (A) Urban design scenarios: density, height & public space impact, (B) Solid void of urban morphology analysis, prepared by the author based on data from [27].

Motivation to develop planning frameworks for holy cities that are under strain and that are based on expert-informed, context-driven information is given further support by these findings. The current findings set the stage for concluding reflections on how culturally grounded urban strategies, like those offered in Scenario 3, can redefine sustainable heritage management in Old Najaf. Some of these reflections are crystallized into core conclusions and practical recommendations that follow.

#### 6.4. Scenario visual summaries

The scenario visuals here represent the baseline concept and spatial intentions of each scenario via design strategies for Old Najaf toward the proposed scenario.

##### 6.4.1. Scenario 1: Cultural spine strategy

This plan is to create a primary cultural hub that unites important landmarks, religious locations, and common public spaces. Improvements will include upgrading pedestrian connections with enhanced corridors, creating new gathering plazas/cultural plazas, installing wayfinding and heritage signage, and developing distracting landscape features that highlight historical stories. The continuous linear pathway will run through the key urban points with cultural features and an open space or public at the shrine of Imam Ali to be more visual in nature.

##### 6.4.2. Scenario 2: Heritage protection network strategy

Among the components that comprise this project, the production of regulatory zoning maps showing the areas to be conserved as well as incentives for restoring and adaptively reusing the designated sites is included, along with guidelines for regulating the development of adjacent zones to ensure that development will be appropriately controlled, and management systems based on GIS and 3D simulations for providing adequate surveillances of these areas. One possible end product of the Visual Representation may be a chain of heritage conservation areas that extend outwards and/or southerly from the specific heritage center, with some distance between heritage center management area (HCMA) and heritage conservation buffer zones or overlays, to provide potential "cushions" to facilitate more gradual adjustment to future urban changes.

### 6.4.3. Scenario 3: Tourism and cultural nodes strategy

Decentralization of tourism through the development of distributed cultural hubs outside sensitive historical cores, peripheral visitor centers and cultural complexes, artisanal markets, museums and interpretive centers, transportation nodes in support of controlled visitor flows, as well as an integrated public space system tying the nodes with the historic core, would all be part of it. Visual representation (indicative) can be a constellation of tourism and cultural nodes distributed strategically around Old Najaf's periphery, connected via sustainable mobility corridors.

## 7. Conclusions

This study concludes that conventional regulatory frameworks and legislative buffer zones are inadequate for the historic urban form of Old Najaf. The research demonstrates that the functions of those mechanics do not take into consideration the unique properties of a sacred site in the city. The lack of formalized processes for participatory planning makes it difficult for urban revitalization projects to fulfill their intended purpose by not considering local significance and actual resident needs. The analysis further identifies that the large amounts of tourist infrastructure located near the shrine complex have a negative effect on the sensitivity of historical sites, and therefore undermine many of the objectives of eco-friendly development in the city.

Research has shown that using digital technologies such as GIS mapping (geographic information system) and digital twins to manage heritage places dynamically can be effective. Of all the planning options tested, Scenario 3 is the most successful in balancing historic preservation and urban development by regulating density and designing according to local urban fabric. Additionally, the study found that developing hybrid planning models (HPM) through collaboration of multiple disciplines will lead to the best outcomes, compared to implementing them solely on an economic basis. In addition to achieving equitable distribution of resources, this method will allow for the continuing evolution of historic sacred landscapes.

### Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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### Author contribution

Husam Sachit Senah: Conceptualization, practical work, writing a literature review, and methodology. Haider Majid Hasan: original draft preparation, data curation, and visualization. Adil Mahdi Jabbar: Reviewing and editing, interpretation, and preparing according to the journal template.

### Ethical approval statement

Ethical approval is not required for this research.

### Informed consent

Informed consent was obtained from all individual participants (experts and specialists) included in the study. The data collection process ensured that all personal identifiers were anonymized to maintain participant confidentiality.

### Declaration of use of AI in the writing process

The authors used Grammarly during the preparation of this work to enhance the linguistic quality, correct grammatical errors, and ensure the clarity of the technical language. The authors reviewed and edited the work as necessary and take full responsibility for the final version.

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