

Comparative Evaluation and Determination of Design Priority Hierarchy in Biophilic Architecture of Traditional and Contemporary Housing (Case Study: Qom City)

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Detailed abstract

Introduction

The increasing separation between human beings and nature in contemporary residential environments has become an important concern in architectural research. The expansion of urbanization, the reduction of natural elements in residential settings, and the predominance of quantitative approaches to housing development have increasingly affected the environmental and experiential quality of dwellings. In this context, biophilic architecture has emerged as an approach that seeks to strengthen the relationship between humans and nature through the intentional integration of natural characteristics, processes, materials, and spatial experiences into the built environment. Biophilic design is therefore not limited to adding vegetation to buildings; rather, it encompasses a broader set of spatial, sensory, environmental, and experiential relationships between occupants and the natural world.

Traditional Iranian housing provides valuable examples of such relationships. In many traditional houses, courtyards, vegetation, water, natural light, semi-open spaces, visual connections with the sky, natural materials, and climatic responses were incorporated into the spatial organization of the dwelling. These characteristics were not necessarily developed under the contemporary concept of biophilic design, yet they created residential environments in which natural processes and human life were closely interconnected. Contemporary housing in many Iranian cities, however, has undergone substantial changes due to increased land values, higher density, changes in household structure, construction technologies, and new patterns of urban development. As a result, several of the spatial characteristics that historically strengthened contact with nature have become weaker or have disappeared.

Qom provides a significant context for examining this transformation. The city has a hot and relatively dry climate, and its traditional architecture developed spatial strategies for responding to climatic conditions while maintaining meaningful relationships between indoor and outdoor environments. The comparison of traditional and contemporary housing in Qom can therefore reveal which biophilic characteristics have been preserved, reduced, or transformed and can provide a basis for establishing design priorities for contemporary housing.

The present study aims to comparatively evaluate the biophilic characteristics of traditional and contemporary housing in Qom and to determine the hierarchy of priorities for incorporating biophilic principles into residential design. The study seeks to identify the characteristics that have the greatest significance in strengthening the relationship between residents and nature and to examine differences between traditional and contemporary residential environments.

Materials and Methods

This research employs a comparative, applied approach based on the evaluation of biophilic characteristics in traditional and contemporary residential environments in Qom. The research framework was developed around a

set of 13 biophilic components derived from theoretical and empirical literature on biophilic architecture and adapted to the architectural and environmental conditions of the study area.

The research proceeded through several stages. First, the relevant theoretical literature on biophilic architecture and the relationship between housing and nature was reviewed to identify the principal characteristics that could be applied to residential environments. These characteristics were then organized into an analytical framework suitable for evaluating traditional and contemporary housing in Qom.

Second, representative examples of traditional and contemporary residential architecture were examined in order to identify the presence and manifestation of the selected biophilic characteristics. The traditional cases were considered in relation to the spatial organization and environmental strategies characteristic of historical housing in Qom, while contemporary cases were evaluated according to their current spatial and architectural conditions.

Third, a structured questionnaire was developed to assess the relative importance and manifestation of the identified biophilic components. The questionnaire was distributed among the selected respondents, and the collected data were statistically analyzed to determine the relative priority of the components and to compare the two residential categories. The analytical procedure focused not only on identifying the existence of biophilic characteristics but also on determining their relative significance in residential design.

The comparative framework made it possible to distinguish between characteristics that represent fundamental and relatively stable principles of biophilic housing and those that are more strongly associated with the spatial structure of traditional Iranian dwellings. This approach allowed the study to move beyond a simple description of traditional architectural elements and toward the identification of design priorities that can be applied to contemporary housing.

Findings

The findings demonstrate a clear difference between traditional and contemporary residential environments in terms of their relationship with nature. Traditional houses in Qom generally provide a more integrated relationship between built space and natural elements. Courtyard organization, vegetation, natural light, water, semi-open spaces, and controlled visual connections create multiple opportunities for residents to experience natural phenomena within the residential environment. These elements operate collectively rather than independently, producing an interconnected spatial system.

The comparison indicates that several characteristics associated with direct and indirect contact with nature have a stronger presence in traditional housing. The courtyard, for example, acts simultaneously as a source of daylight, ventilation, vegetation, visual openness, and sensory experience. Semi-open spaces establish gradual transitions between interior and exterior, while windows and openings provide controlled visual and environmental connections with natural elements. Natural materials and textures also contribute to sensory contact with nature.

In contemporary housing, many of these relationships have been weakened because of changes in plot dimensions, increased density, reduced open space, and the dominance of enclosed interior areas. Although some biophilic characteristics continue to appear in contemporary dwellings, they are often introduced as isolated features rather than as components of an integrated spatial system. Greenery may be limited to balconies or small interior spaces, natural light may be constrained by neighboring buildings, and visual or physical access to open space may be reduced.

The prioritization of the biophilic components indicates that the most important characteristics are those capable of simultaneously improving environmental performance and strengthening the experiential relationship between residents and nature. In particular, characteristics related to strong natural connections, vegetation, natural light, spatial openness, visual contact with nature, and transitional spaces emerge as important priorities for residential design. The findings suggest that biophilic quality is strengthened when several components operate together rather than when a single natural element is introduced independently.

The traditional housing examples also demonstrate that climatic adaptation and biophilic design can be mutually reinforcing. Courtyards, vegetation, shade, water, natural ventilation, and semi-open spaces contribute not only to contact with nature but also to thermal comfort and environmental performance. This indicates that biophilic strategies in the climatic context of Qom should not be treated merely as aesthetic interventions. Their

effectiveness increases when they are integrated with passive environmental strategies and the spatial organization of the dwelling.

The comparative results further indicate that contemporary housing has the potential to recover some of the lost relationships without simply reproducing the physical form of traditional houses. The objective should instead be to reinterpret their underlying principles. For example, the traditional courtyard can be translated into contemporary semi-open communal spaces, planted terraces, internal courtyards, light wells, and carefully designed visual connections. Similarly, traditional strategies for shade and ventilation can be combined with contemporary construction systems to create residential environments that respond simultaneously to climatic and experiential requirements.

Discussion and Conclusion

The findings demonstrate that the distinction between traditional and contemporary housing is not simply a difference in architectural appearance. It represents a transformation in the relationship between residential space and nature. Traditional housing in Qom developed a relatively integrated environmental system in which natural elements, climatic responses, spatial organization, and human experience were closely interconnected. Contemporary housing, by contrast, frequently separates these dimensions and treats natural elements as supplementary rather than structural components of residential design.

The principal contribution of this study is the determination of a priority-oriented framework for biophilic residential design in Qom. Rather than proposing the indiscriminate application of all biophilic principles, the research emphasizes the need to establish a hierarchy according to climatic conditions, spatial possibilities, and residential needs. This is particularly important in dense contemporary urban environments, where the complete reproduction of traditional housing patterns may not be feasible.

The comparison also demonstrates that traditional Iranian architecture should not be regarded merely as a historical model to be reproduced. Its value lies in the environmental and spatial principles embedded within it. The integration of vegetation, natural light, water, air movement, courtyards, semi-open spaces, and visual connections illustrates a design logic that can be reinterpreted through contemporary architectural technologies and changing patterns of habitation.

For Qom, the findings suggest that future residential design should prioritize strategies that restore meaningful and continuous contact between residents and nature while simultaneously responding to the city's climatic conditions. Such strategies can include the development of planted courtyards, shaded semi-open spaces, natural ventilation paths, controlled daylight, visual connections with vegetation and sky, natural materials, and intermediate spaces between interior and exterior.

Overall, the study concludes that biophilic architecture in residential environments should be understood as an integrated spatial strategy rather than an aesthetic addition. Traditional housing in Qom demonstrates that environmental performance, contact with nature, and spatial quality can be achieved simultaneously when these factors are incorporated into the fundamental organization of the dwelling. The proposed priority hierarchy can therefore serve as a conceptual and practical basis for architects seeking to improve the biophilic quality of contemporary housing in Qom and other cities with comparable climatic and cultural conditions.

Declarations

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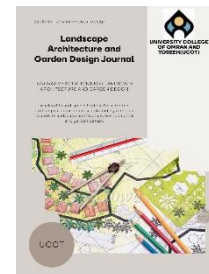
Ethical Approval: The research was conducted in accordance with applicable research principles. No intervention involving human subjects was performed.

Data Availability: The data supporting the findings of this study are available from the corresponding author upon reasonable request.



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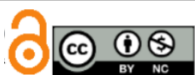
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Keywords: Biophilic architecture; Traditional housing; Contemporary housing; Design priority; Biophilic design; Qom; Residential architecture; Human–nature relationship



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