

Adaptive Landscape Design Strategies for Cultural Heritage Conservation in Urbanizing Regions

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Abstract: In the context of rapid urbanization, the spatial pattern of cultural heritage has been squeezed and fragmented, and it is difficult for traditional protection methods to meet the needs of heritage continuity and urban development synergy. Based on the perspective of adaptive landscape design, this article systematically discusses the landscape renewal strategy and implementation path of cultural heritage protection in urbanized areas around the four aspects of spatial integration and renewal, functional composite implantation, ecological restoration integration, and multi-party collaborative participation, with a view to achieving the coordination and unification of the continuation of heritage value and the sustainable development of the city.

Keywords: Urbanized areas; Cultural heritage protection; Adaptive landscape design

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1. Introduction

As the spiritual pillar of urban development, urban historical and cultural heritage carries rich historical memories and cultural connotations. With the increase in land use intensity and the intensification of spatial reconstruction, the historical environment on which cultural heritage depends continues to be affected, and the contradiction between protection and development is becoming more and more prominent. The traditional static protection model has become difficult to adapt to the complex needs of urban renewal, and more flexible and sustainable design methods need to be introduced to deal with it. Adaptive landscape design emphasizes the continuation and regeneration of heritage elements in dynamic changes, and provides a new path for coordinating cultural protection and urban development ^[1]. Therefore, it is of great significance to explore its application in the protection of cultural heritage in urbanized areas.

2. Principles of adaptive landscape design

2.1. Value-oriented principle

The value-oriented principle emphasizes that in the process of adaptive landscape design, it is necessary to take the identification and protection of the core values of cultural heritage as the premise, and take the historical value, cultural value and ecological value as the basic basis for design decision-making. In the process of complex spatial renewal in urbanized areas, landscape design cannot only focus on visual optimization or functional improvement, but should give priority to ensuring the integrity and authenticity of the heritage body and its historical environment. Through the systematic evaluation of the level of heritage value, the priority of protection and the scale of intervention are clarified, so that the design strategy always revolves around the continuation of value. At the same time, attention is paid to the refining and expression of local cultural characteristics in the renewal process, so that landscape design has not only become a tool for spatial reconstruction, but also an important carrier for the continuation of cultural memory, so as to achieve the coordination and unity of protection and development ^[2].

2.2. Principles of dynamic adaptation

The principle of dynamic adaptation emphasizes that adaptive landscape design should have the ability to cope with the continuous changes in the urban environment, so that cultural heritage spaces can maintain the adaptability and sustainability of functions and structures at different stages of development. In the process of urbanization, the demographic structure, usage needs, and spatial functions are constantly changing, and the traditional rigid design model is difficult to meet long-term development needs. Therefore, it is necessary to realize the dynamic evolution of space through flexible design and phased renewal mechanisms. This principle requires that adjustable space and variable structures be reserved in the early stage of the design, and through modular design, reversible intervention, and phased implementation strategies, the landscape system can be adaptively adjusted according to changes in external conditions ^[3]. At the same time, through the introduction of dynamic monitoring and feedback mechanisms, the use status of heritage space and environmental changes are continuously evaluated, and the design strategy is optimized accordingly, so as to realize the transition from static protection to dynamic update.

2.3. The principle of synergy and symbiosis

The principle of synergy and symbiosis emphasizes that in adaptive landscape design, the relationship between cultural heritage protection, urban development and social needs should be coordinated, and a collaborative mechanism of multi-subject participation and multi-element integration should be constructed. In the actual design and implementation process, not only professional technical support for planning and design is required, but also the joint participation of the government, the community and the public is required to form a multi-party governance pattern. Through the integration of historical and cultural resources, ecological environment elements and urban functional systems, the organic integration between different spaces and functions is realized. At the same time, the interaction between heritage space and urban life is emphasized, so that cultural heritage can be transformed from a “protected object” to a “participatory public space”, and its social value and sustainable vitality can be enhanced in the development of symbiosis ^[4].

3. The main problems facing cultural heritage in urbanized areas

In the process of rapid spatial reconstruction of cultural heritage in urbanized areas, it generally faces multiple and complex problems, mainly reflected in the broken spatial pattern, functional decline, ecological environment degradation, and imperfect governance system. At the spatial level, urban expansion and infrastructure construction continue to squeeze the heritage space, causing the original historical pattern to be cut, encroached upon or even eliminated, resulting in a decline in overall continuity and identification; it is difficult to effectively realize the corresponding space integration and renewal needs ^[5]. At the functional level, the traditional cultural heritage space gradually loses its original use function; there is idle or inefficient use, insufficient cultural vitality, and a clear disconnect in the functional composite implantation strategy. At the ecological level, high-density development has changed the original natural substrate, the connection between the green space system and the historical environment has been weakened, and the continuity of the landscape has been destroyed. It is urgent to improve it through ecological restoration and integration. At the management level, it involves multiple entities such as planning, cultural relics, construction, and communities, but the coordination mechanism is insufficient; there are problems such as decentralization of authority and responsibility and low collaborative efficiency, making it difficult for multiple parties to participate in coordination. Effective implementation ^[6].

4. Adaptive landscape design strategies for cultural heritage protection in urbanized areas

4.1. Spatial integration and renewal, reshaping the heritage pattern

Adaptive landscape design emphasizes the overall continuation and orderly regeneration of historical heritage through spatial structure optimization in a dynamic urban environment. Spatial integration and renewal not only focuses on the repair of physical forms, but also emphasizes the systematic identification and reconstruction of historical patterns ^[7]. Its core lies in rebuilding the logical relationship between heritage spaces through landscape means, so that the fragmented historical elements can be re-formed as a whole. This strategy provides structural support and spatial foundation for the protection of cultural heritage in urbanized areas.

First of all, the overall spatial sorting and value identification of cultural heritage and its surrounding environment should be carried out, and the spatial hierarchical relationship between the core protected areas, coordination areas and display areas should be clarified, so as to avoid the pattern fracture caused by a single point of isolated protection. Through GIS analysis and historical layer overlap technology, the texture and axis relationship of the historical space are restored, and the overall readability and continuity of the heritage space are strengthened. Secondly, the concept of “micro-renewal + acupuncture-style intervention” is introduced in the renewal process, and the overall pattern optimization is driven by local spatial restoration, such as landscape reshaping of broken streets, disappearing interfaces, and broken nodes, so that the historical network can be gradually restored. Again, by building a continuous public space system, connecting greenways, walking systems, and historical heritage nodes to form an open space network with both accessibility and experiential value, thereby enhancing the overall vitality of the heritage space. Finally, the visual expression of historical information should be emphasized in the spatial integration, and the historical pattern should be reproduced through paving, interface control and landscape identification systems, so that users can perceive the historical spatial structure in the modern urban environment, and

realize the unity of “morphological reconstruction” and “cultural reproduction”.

4.2. Functional composite implantation, cultural activation and utilization

Functional composite implantation is an important strategy of adaptive landscape design, emphasizing the introduction of multiple functions on the basis of protecting the ontology of heritage, and realizing the reuse and reproduction of cultural space. This strategy breaks through the traditional single protection model, shifts cultural heritage from static preservation to dynamic use, and continues historical and cultural values while meeting the needs of modern cities. Its essence is to activate the social attributes and economic vitality of the heritage space through functional superposition ^[8].

First of all, the functional classification should be based on the carrying capacity and cultural attributes of the heritage space, the principle of low intervention in the core protected area and the principle of moderate openness in the available area should be clarified, and appropriate functions should be introduced under the premise of ensuring authenticity and integrity. Secondly, pay attention to cultural orientation in the process of functional implantation, and embed functions such as exhibition, cultural experience, and educational communication into the heritage space, making it an important carrier for cultural communication, while avoiding excessive commercialization and erosion of historical authenticity. Again, the dual use of time and space is realized through composite functional organizations, such as combining public cultural activities during the day with leisure experiences at night to improve the efficiency of space use and enhance the vitality and continuous attractiveness of the place. Finally, through the design of flexible spaces and the configuration of modular facilities, the functions should be dynamically adjusted according to the needs of use, and a “convertible, renewable, and sustainable” use mechanism should be realized, so as to promote the transformation of cultural heritage space from a “protected object” to a “living place”.

4.3. Integration of ecological restoration and continuous landscape creation

The integration of ecological restoration emphasizes the reconstruction of the inherent connection between the natural ecosystem and the historical environment in the process of cultural heritage protection, and improves the overall landscape quality and environmental continuity through ecological foundation restoration. In urbanized areas, high-intensity development often destroys the original natural substrate and disconnects the historical and cultural environment from the ecosystem ^[9]. Therefore, it is necessary to achieve coordinated restoration of the two through landscape design. This strategy emphasizes the joint restoration and integration of ecological and cultural nature.

First of all, the heritage area and its surrounding ecological environment should be systematically evaluated, including basic elements such as water system structure, vegetation distribution and soil conditions, and ecologically degraded areas should be identified and targeted restoration plans should be formulated. By restoring the connectivity between native vegetation communities and water systems, the natural foundation of the historical environment is rebuilt. Secondly, ecological corridors and green buffer zones are introduced in landscape design to organically connect the ecosystem with the cultural heritage space, reduce the interference of urban construction on the heritage environment, and enhance the overall ecological stability. Again, through the application of the sponge city concept and low-impact development technology, the rain and flood regulation capacity and ecological cycle efficiency will be improved, so that the heritage space will have stronger environmental adaptability. Finally, the integration of ecological

landscape and cultural expression should be strengthened, and ecological restoration should be made not only functional, but also a cultural narrative through natural materials, local plants, and historical landform reproduction, so as to achieve the dual goals of “ecological continuity” and “cultural continuity”.

4.4. Multi-party collaborative participation, optimization of governance mechanism

Multi-party collaborative participation is an important guarantee for the implementation of adaptive landscape design. Its core lies in the construction of a governance system with the participation of the government, professional institutions, communities and the public to achieve the systematization and sustainability of cultural heritage protection. In a complex urbanized environment, it is difficult for a single entity to complete the task of heritage protection and renewal, so it is necessary to rely on multiple collaborative mechanisms to improve governance effectiveness.

First of all, a cross-departmental collaborative management mechanism should be established to integrate the functions of different departments such as planning, cultural relics protection, and urban construction to form a unified and coordinated decision-making system to avoid management fragmentation and implementation conflicts. Secondly, the community participation mechanism should be strengthened, and through public participation in design, consultation meetings and co-construction projects, residents should be made important participants and beneficiaries of cultural heritage protection, thereby enhancing the social foundation and sense of identity of protection. Once again, the research power of professional institutions and universities is introduced to provide technical support and theoretical guidance for heritage protection, including digital monitoring, landscape assessment and renewal strategy optimization, etc., to improve the science of decision-making and the accuracy of implementation ^[10]. Finally, a long-term operation and feedback mechanism should be established. The management strategy should be continuously adjusted through dynamic monitoring and effect evaluation, so that the governance system can continuously optimize. The transformation from “single construction” to “long-term governance” should be realized, so as to ensure the coordinated promotion of cultural heritage protection and urban development.

5. Conclusion

Adaptive landscape design provides a new method and path for the protection of cultural heritage in urbanized areas. Through multi-dimensional strategies such as spatial reconstruction, functional regeneration, and ecological restoration, it helps to enhance the overall continuity and vitality of the heritage space. In practice, the identification and hierarchical protection of heritage values should be strengthened, and the deep integration of design strategies and local cultural characteristics should be promoted. At the same time, improving the governance system through multi-party collaborative mechanisms can further improve the protection efficiency and implementation effect, so as to achieve the coordinated development of cultural heritage protection and urban renewal.

Disclosure statement

The author declares no conflict of interest.

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