Resilience Analysis of the Layered Spatial Model of Liangzhu from the Perspective of 'Ancient City-New City' Symbiosis

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Abstract: This study focuses on the conflict between the conservation of large-scale archaeological sites and regional development in the context of rapid urbanization. Taking the spatial zoning model developed around the Liangzhu Ancient City Site as a case study, it explores the underlying mechanisms for coordinating conservation and development. Through comprehensive methods including literature review, field surveys, and comparative case analysis, the research systematically examines the spatial composition and functional organization of the Liangzhu zoning model from a spatial planning perspective. The findings reveal that the model, through a gradient layout of three zones-the core conservation area, the cultural tourism service area, and the peripheral new town-along with complementary functions, effectively achieves a dynamic balance between historical preservation, contemporary development, and ecological sustainability. Its internal dynamics stem from incremental development driven by a "catalytic effect," while the core mechanism lies in the synergy between historical stratification and urban resilience: spatially, it respects and clearly articulates historical layering; systematically, it enhances the region's capacity to cope with uncertainties by fostering social, economic, ecological, and spatial resilience. Ultimately, the study constructs a three-dimensional analytical framework of "layering-resilience" encompassing temporal, functional, and procedural dimensions. This framework aims to provide theoretical tools and practical guidance for the planning assessment and sustainable development of similar regions, particularly large-scale sites located in urban peripheries or built-up areas.

Keywords: Liang Zhu; Liang Zhu Cultural Village; Heritage Conservation; Resilient City

1. Introduction

The Archaeological Ruins of Liangzhu City in China, as a World Heritage site, possess Outstanding Universal Value. It represents the most precious heritage left by humankind and is a common treasure for all humanity[1]. Its conservation and regional development constitute a central tension within the process of rapid urbanization.

On the one hand, large-scale heritage sites have often been subjected to traditional isolation-based conservation approaches, which led to early conservation efforts in China frequently encountering dilemmas such as "lack of legal basis," "non-compliance with existing regulations," and "inadequate capacity for conservation.[2]" On the other hand, unmitigated urban expansion can lead to destructive impacts on the heritage site itself and its surrounding environment, as conservation efforts face pressures from activities such as infrastructure construction and daily residential life and production[3].

The "heritage park + cultural village + new town" concentric spatial model explored in the Liangzhu area has proven to be a successful practice in coordinating heritage preservation and regional development. It serves as an effective approach to addressing the common challenges of commercialization, artificialization, and urbanization faced by World Heritage sites[1].

This study aims to examine the material composition and functional dimensions of the spatial model surrounding the Liangzhu Ancient City Archaeological Site Park. It will conduct an in-depth analysis of its "layering-resilience" development mechanism, which integrates historical stratification, contemporary functions, and ecological processes, as well as the theoretical implications underlying this mechanism. Ultimately, the research seeks to construct a generalizable and universally

applicable analytical framework.

Theoretically, it intends to address the existing research gap, which has predominantly focused on archaeology, tourism management, and the construction of the site park itself, while lacking systematic mechanistic analysis of spatial planning from a macro perspective. This will enrich spatial theory that combines "historical layering" with "resilient development." In practical terms, summarizing the Liangzhu experience can provide an actionable paradigm for other large-scale heritage sites in China, particularly those located within or on the edges of urban built-up areas.

This study integrates multiple research methods, including literature review, case comparison, and spatial analysis, and adopts an interdisciplinary perspective combining landscape architecture and urban-rural planning to conduct an in-depth investigation of heritage conservation issues.

By synthesizing literature from previous researchers, this study examines key theories in heritage conservation and urban planning, including the conservation principles established by *The Venice Charter* and the *Xi'an Declaration*, [4] the holistic framework of the Historic Urban Landscape (HUL)[13], and the cutting-edge concepts of resilience planning, thereby laying a theoretical foundation for the research.

Based on theoretical research, this study selects several World Heritage ancient cities, such as Angkor, Troy, and Shangdu (Xanadu), as comparative cases. Through a horizontal comparison with the Liangzhu model in terms of balancing conservation and development, spatial organization strategies, and community participation mechanisms, the study aims to extract relevant experiences and insights.

Regarding the conservation and utilization of archaeological site parks, the academic community both domestically and internationally has conducted in-depth explorations from multiple dimensions. In terms of conservation and display research, scholars such as Cao Xin and Zhang Fan, based on the case of the Yuanmingyuan, emphasize that conservation should prioritize integrity, and utilization should align with cultural authenticity. In the realm of drawing on international experience, Huang Kejia and Han Jianye, through their analysis of Germany’s Dupe Site Park, advocate for China to develop living interpretation and enhance public participation.

These academic discussions have ultimately been integrated at the level of national policy. The Special Plan for the Conservation and Utilization of Major Archaeological Sites During the 14th Five-Year Plan Periodexplicitly proposes to “bring heritage to life” and is committed to resolving the “contradiction between conservation and urban-rural development and construction.” The plan identifies promoting the high-quality development of national archaeological site parks as a core task, emphasizing, from a strategic height, regional coordination and networked narratives in heritage conservation.

2. Deconstruction of the Spatial Pattern and Analysis of the "Layering-Resilience" Mechanism in the Liangzhu Area.

2.1 Regional Overview and Context of Pattern Formation

The Liangzhu Site is a sacred site providing material evidence of over 5,000 years of Chinese civilization. Within its core area of approximately 50 square kilometers, archaeological sites are densely concentrated, with survey reports recording a total of 135 sites[5]. However, with the ongoing economic development, traditional conservation efforts face challenges such as urban encroachment, conflicts with villagers' production and livelihoods, and the fragmentation between conservation and development[2].

The formation of this model is the result of multiple interacting factors. From a policy-driven perspective, the national promotion of large-site conservation and the construction of National Archaeological Site Parks in recent years has provided a top-level design for this model. In terms of urban planning, the latest *Detailed Plan for the Liangzhu Cultural Village Unit in Yuhang District, Hangzhou (Draft)* further takes "regional coordination, ecology-based planning, and stock regeneration" as its orientation, aiming to create a "distinctive cultural gateway to the Liangzhu Site and a new cultural-living community." Socioeconomically, the current strong demand for urbanization in the region requires the site area and its surroundings to transform conservation pressure into development momentum through functional deconcentration and value conversion, thereby catering to the prevailing needs of contemporary urban development.

2.2 Deconstruction of the Material Composition of the Spatial Pattern

2.2.1 The core conservation zone (site park)

Centered on the National Archaeological Site Park, this zone strictly protects the site's physical remains and its historical setting. Its core functions are cultural services and ecological regulation. Spatially, it takes the archaeologically exposed heritage fabric as the core, supplemented by interpretation facilities, and is set within a vast base of ecological farmland and water bodies, forming a low-intervention, low-density open space.

2.2.2 Cultural-Tourism and commercial service zone (cultural village)

Serving as a buffer and transitional belt, this zone features highly mixed functions. It includes facilities dedicated to cultural and tourism services, such as the National Archives of Publications and Culture, the Liangzhu Museum, and the Meilizhou Church. It also incorporates spaces for enriching community life, like the Yuniaoji Commercial Street, as well as venues for cultural exhibition and creativity, such as the Big Roof Culture and Arts Center. According to the detailed plan, its functional positioning is clearly defined as a "Cultural Slow-Living Residential Community in Hangzhou," a "Cultural Tourism Area of the Liangzhu Site," and an "Innovation Incubation Zone along the Cultural Corridor."[6]

In terms of public service facilities, the area overall exhibits a mixed-use community fabric with buildings of human scale. Public spaces are organized around community hubs such as the "Jade Bird Tassel" plaza. The architecture, designed by masters including Tadao Ando and Liu Yichun, has become a cultural landmark[7].

2.2.3 Outer residential zone (new town)

It primarily handles residential, industrial, and comprehensive service functions, serving as the primary bearer of the region's population and economy. Spatially, it features a typical modern urban fabric, with a regular road network and relatively high development intensity. The area is closely connected to downtown Hangzhou via subway lines and expressways.

2.3 Spatial Expression Mechanism of Historical Layering

The Liangzhu area is a living specimen of historical layering. From the perspective of its natural foundation, the foothills of the Tianmu Mountains and the East Tiaoxi River form a mountain-water layout, which constituted the foundation for the site selection by the ancient Liangzhu people. The historical remains of the Liangzhu Ancient City site, in turn, overlay traces of the Liangzhu cultural layer and subsequent layers of agrarian civilization[8].

The Cultural Village and the New Town, as new functional layers, are embedded into the historical setting in a humble and integrated manner. For instance, the architecture of the Cultural Village echoes historical forms and materials in its design. This superimposition does not entail overwriting; rather, through a spatial narrative, it allows visitors and residents to experience a continuum of stories-from ancient civilization to modern life-as they traverse the different concentric zones.

2.4 Spatial Support Mechanism for Resilient Development

The concentric zoning structure provides the region with multi-faceted resilience in responding to internal and external disturbances.

In terms of social resilience, the Liangzhu Ancient City Archaeological Site Park, as the core zone, shapes national and ethnic identity through site interpretation and cultural transmission. The Liangzhu Cultural Village, serving as the intermediate zone, fulfills public consumption needs with commercial facilities such as Yuniaoji. The outer new town offers a diverse and inclusive modern urban lifestyle.

Regarding economic resilience, the industrial composition is diversified to withstand fluctuations. The cultural-tourism industry complements sectors such as design and creativity, wellness, and residential real estate. As a "cultural tourism area" and an "innovation incubation zone," the mixed-use functions of the Cultural Village further ensure economic vitality and diversity.

In relation to ecological resilience, the zoning structure itself forms an ecological gradient. The core zone strictly conserves wetlands and farmland, while the Cultural Village acts as an ecological buffer. Through green corridors, waterfront parks, and multiple thematic parks, it constitutes a blue-green network that emphasizes low-density development and green permeability, thereby maintaining hydrological cycles and biodiversity.

The spatial resilience of this structure is manifested in its polycentric network

configuration. The Site Park, the community center of the Cultural Village, and the commercial center of the new town form multiple vibrant nodes that functionally complement one another. The planning establishes a well-defined hierarchical road system, enhancing spatial connectivity and redundancy[9].

2.5 Dynamic Mechanism of Pattern Formation: Catalytic Effect

The above multi-layered spatial structure provides robust resilience support to social, economic, ecological, and other systems, offering a cross-sectional perspective for understanding its static functions and benefits. However, this highly efficient and elastic spatial configuration is not a predetermined blueprint; rather, its formation is a dynamic process that evolves progressively under the triggering and guidance of key factors. Therefore, to move beyond a static description of structural features and gain a deeper understanding of its generative logic and inherent principles, it is necessary to shift to a dynamic perspective and analyze the core driving mechanisms behind the formation and evolution of this spatial model.

In the formation process of the model, key projects serve as "catalysts" that trigger the formation and evolution of the concentric zoning pattern. In the late 20th century, Wayne Attoe and Donn Logan coined and extended the concept of the "urban catalyst" in their work, referring to an agent capable of initiating a chain reaction in the surrounding urban space, positively influencing subsequent development activities, and thereby accelerating the pace of urban transformation[10].

Primary catalysts are triggered by the conservation of the site area. As a World Cultural Heritage site, the Archaeological Ruins of Liangzhu City hold outstanding universal value. Its archaeological discoveries and successful inscription on the World Heritage List established the region's core value and the imperative for its protection.

Secondary catalysts involve the enrichment of functions and the shaping of value, referring to the establishment of the Liangzhu National Archaeological Site Park and the completion of the Liangzhu Culture and Arts Center. The site park transforms conservation into an experiential public space, while the Liangzhu Culture and Arts Center, as a cultural landmark, activates the intermediate zone, linking the heritage culture with contemporary life.

Tertiary catalysts encompass the formation of an integrated network and the enhancement of community quality, exemplified by the overall development of Vanke Liangzhu Cultural Village, the operation of the Yuniaoji commercial district, and the latest detailed unit planning. Through systematic spatial planning, functional connections and spatial quality between the concentric zones are further strengthened, achieving a systematic shift from project-driven to planning-led development.

3. Case Comparison, Theoretical Elucidation, and Framework Construction

3.1 Domestic and International Comparison of Conservation and Development Models for Historic City Sites

Table 1. Comparison of the Preservation Status of World Heritage Sites

Site Name	Area	Conservation and Development	Spatial Organization Pattern	Community Participation
Angkor	Asia	Conservation-first	Scattered temple clusters and the core protected area	Community livelihoods are closely linked to tourism.
Archaeological Site of Troy	Asia	Centered on archaeological research, conservation, and presentation.	Layered Interpretation Archaeological Park	Residents of surrounding communities primarily provide tourism services, such as serving as guides.
Ancient Thebes with its Necropolis	Africa	Conservation faces ongoing challenges.	Large-scale archaeological site complexes scattered linearly along both banks of the Nile River.	The community and the heritage site are closely interwoven
Archaeological Areas of Pompeii, Hercula-neum and Torre An-nunziata	Europe	Give equal weight to conservation, research, and public presentation.	Large-scale open-air archaeological site museum	The local economy relies extensively on heritage-based tourism.
Archaeological Sites	Europe	Apply stringent	Acropolis ruins and their	Local residents provide

of Mycenae and Tiryns		protection to archaeological sites and their historic landscape	surrounding historic setting.	cultural tourism services and participate in heritage conservation.
Maya Site of Copan	South America	Synthesize preservation, study, and eco-tourism	Core Ceremonial Area and Archaeological Park	Local Maya communities actively participate, and their traditional knowledge is applied in the interpretation of the heritage.

Based on the compilation in Table 1, a comparative analysis between the Liangzhu Ancient City site and other archaeological sites reveals that the "concentric zoning model" explored at Liangzhu is particularly notable for its innovativeness and comprehensiveness in coordinating a high-intensity human-land relationship. It integrates "community development" as an organic component of conservation. Through the proactive planning of the Liangzhu Cultural Village, the model systematically accommodates tourism services, residential needs, and creative industries, thereby preventing the core conservation zone from falling into a passive developmental predicament.

In terms of spatial organization, Liangzhu's concentric structure demonstrates stronger spatial agency and a clear functional gradation. This differs fundamentally from the spontaneously formed, functionally homogeneous service towns around sites such as Pompeii and Copán.

Regarding community participation, the Liangzhu model also exhibits distinct depth and mechanisms. Through systematic community planning, it not only safeguards the rights and development of the original inhabitants but also attracts new residents to jointly build a new community that shares heritage values.

In summary, the Liangzhu model represents an "integrative" solution, proactively constructed through forward-looking, systematic spatial planning at the forefront of rapid urbanization. It fosters a symbiotic relationship between heritage conservation, community development, and ecological sustainability, offering a highly referential Chinese practice for large archaeological sites globally facing similar challenges.

3.2 "Layering-Resilience" Spatial Development Analytical Framework Construction

Based on the structural and analytical discussion of the Liangzhu model above[9], it represents a highly innovative conservation and development model that is closely integrated with urbanization processes. It can provide planning guidance for the "Layering-Resilience" analytical framework, as shown in Figure 1.

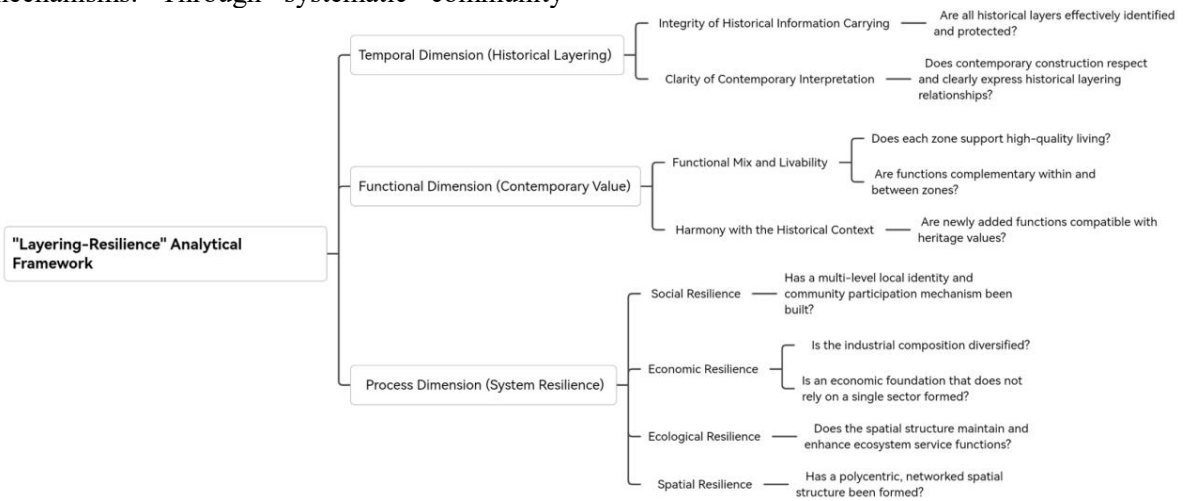

Figure 1. "Layering-Resilience" Analytical Framework

In the temporal dimension, systematic archaeological investigation and value assessment should be actively conducted. Contemporary interventions should employ a "dialogue between old and new" design language, avoiding rigid historical imitation, enhancing legibility, and connecting natural and historical foundations through a blue-green space network.

In the functional dimension, a clear spectrum of zonal functions should be planned. Mixed-use

communities should be cultivated in the intermediate zone, incorporating compatible industries such as cultural creativity and education[7]. Public service facilities-including cultural centers, schools, and neighborhood amenities-should be improved to enhance livability.

In the process dimension, guided by government planning drafts and land-use zoning, a mechanism for community co-construction and benefit-sharing should be established. A composite "culture-tourism+" industrial system should be developed, and multiple functional centers-such as tourist gateways and community hubs-should be strategically distributed. This forms a networked structure to strengthen spatial connectivity and create a coherent planning itinerary.

3.3 Conclusions

This study takes the concentric "site park + cultural village + new town" model of Liangzhu as a case to explore pathways for balancing the conservation and development of large-scale heritage sites amidst urbanization. This model represents a spatial innovation against the backdrop of intense human-land relations, and its success relies on a synergistic "layering-resilience" mechanism.

Spatially, the three concentric zones achieve a gradient balance: the core site park, as a low-intervention open space, ensures heritage integrity while fulfilling scientific, educational, and ecological functions; the intermediate cultural village acts as a buffer, concentrating cultural-tourism, residential, and creative industries, thereby alleviating tourism pressure on the core while fostering a cultural community; the outer new town accommodates modern urban functions, connects to downtown Hangzhou, and facilitates a smooth transition from the historical to the contemporary.

Mechanistically, "historical layering" is manifested through the respect for and continuous expression of the cultural, agrarian, and construction layers. "Urban resilience" is systematically enhanced through social identity, diversified industries, ecological gradients, and a polycentric network, strengthening the region's capacity to cope with uncertainties. This model evolved gradually through key catalytic projects such as World Heritage inscription, park construction, and the development of the cultural village.

In summary, the Liangzhu model transforms conservation and development into a symbiotic practice through spatial gradation and mechanistic synergy. The "layering-resilience" framework provides an operational assessment tool and strategic insights for the conservation and utilization of other large-scale heritage sites.[11]

4. Limitations and Prospects

4.1 Limitations of the Study

This study has several inherent limitations. Although it constructs a "layering-resilience" analytical framework, the generalizability of this framework primarily relies on the single case study of Liangzhu and has yet to be validated in other comparable contexts. Regarding mechanism analysis, the research places a stronger emphasis on theoretical construction and static description, lacking technical exploration into the dynamic simulation and refinement of synergistic mechanisms. Simultaneously, the research focus remains predominantly on spatial patterns and planning mechanisms, with insufficient exploration of the supporting institutional systems-spanning land use, finance, and governance-that are essential for implementing this model. Furthermore, there is a scarcity of quantitative data supporting and continuously evaluating aspects like the specifics of community governance, resident participation, and the long-term socio-economic efficacy of the model. These shortcomings, pertaining to the breadth of application, depth of analysis, connection to institutional frameworks, and robustness of data support, constitute the primary directions for future deepening and expansion of this research.

4.2 Prospects

Future work will include applying this framework to other ancient city site protection and development cases for comparative verification and improvement, thereby further testing and optimizing the evaluation framework. This aims to achieve better integration of site protection with regional economic and social development[12], contributing wisdom to heritage preservation.

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